Chapter III: Affected Environment

Introduction

This chapter presents a description of resource topics analyzed in this environmental assessment and baseline (or existing) conditions under each resource topic. Topics were selected for environmental analysis based on federal law, regulations, and executive orders; National Park Service management policies; and concerns expressed by the public, park staff, or other agencies during the public scoping process. A short rationale for the inclusion of each topic is discussed below in the Topics Considered in this Environmental Assessment section. Topics that were dismissed from further analysis in this environmental assessment are discussed at the end of this chapter.

Resource topics are described in relation to two geographical settings that could be affected by the alternatives: the regional setting and the project setting. For most resource topics, the regional setting in this environmental assessment is Yosemite Valley, which is the geographic basis for the cumulative impacts analyses in Chapter IV, Environmental Consequences. An analysis of the Yosemite Lodge Area Redevelopment in a larger regional context is found in the *Yosemite Valley Plan* (NPS 2000a). The project setting encompasses approximately 107 acres (referred to as the project area in this environmental assessment). Project implementation would be performed within the project setting.

Topics Considered in this Environmental Assessment

The federal and state Endangered Species Acts (and associated legislation), Clean Water Act, Clean Air Act, and National Environmental Policy Act require that the effects of any federal undertaking on natural resources be examined. In addition, the National Park Service management policies and natural resource management guidelines call for the consideration of natural resources in planning proposals. Significant natural resources, such as special-status species, exist within the park and could be affected to varying degrees by implementation of the alternatives.

The project area is located in Yosemite Valley north of the Merced River and immediately west of Yosemite Creek and the Lower Yosemite Fall area within Yosemite National Park—an area of abundant natural resources. It is therefore necessary to characterize these natural resources and the environmental consequences to these resources that would result from implementation of Yosemite Lodge Area Redevelopment alternatives.

Analysis was performed for the following natural resource topics:

- Geology, Geologic Hazards, and Soils
- Floodplains and Water Resources
- Wetlands
- Vegetation
- Wildlife
- Special-Status Species
- Air Quality
- Noise

The National Historic Preservation Act, the Archeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Environmental Policy Act require that the effects of any federal undertaking on cultural resources be examined. In addition, National Park Service management policies and cultural resource management guidelines call for the consideration of cultural resources and Native American consultation in planning proposals. The project area contains cultural resources and is a contributing element within the Yosemite Valley Cultural Landscape.

Cultural resource impacts in this document are described in terminology consistent with the regulations of the Council on Environmental Quality, and in compliance with the requirements of the National Environmental Policy Act, Section 106 of the National Historic Preservation Act, and the 1999 Programmatic Agreement regarding the planning, design, construction, operations, and maintenance of Yosemite National Park. The Section 106 determination of effect for the undertaking (implementation of the alternative), required by the Programmatic Agreement, is included in the "Section 106 Summary" for each alternative, presented in Chapter IV, Environmental Consequences.

Analysis was performed for the following cultural resource topics:

- Archeological Resources
- American Indian Traditional Resources
- Cultural Landscape Resources, including Historic Sites and Structures

The social resources analysis examines the effects of the Yosemite Lodge Area Redevelopment on the social environment in Yosemite Valley. The park's scenic resources are a major component of the park visitor's experience. Conserving the scenery is a crucial component of the National Park Service 1916 Organic Act and the park's enabling legislation. Stewardship of Yosemite National Park requires consideration of two integrated purposes: to preserve Yosemite's unique natural and cultural resources and scenic beauty, and to make these resources available to visitors for study, enjoyment, and recreation.

Analysis was performed for the following social resource topics:

- Scenic Resources
- Visitor Experience
- Socioeconomics
- Transportation
- Park Operations and Facilities
- Hazardous Materials

Natural Resources

Geology, Geologic Hazards, and Soils

Regional Setting

Geology

Granite is the dominate bedrock type in Yosemite Valley and forms much of the Sierra Nevada range. From the eastern end of the Valley near Happy Isles to its western end near Bridalveil Meadow, the Valley exhibits the classic , glacially carved "U" shape. Steep granite walls rise 1,500 to 4,000 feet above the Valley floor. Mixtures of soil and rock hundreds of feet thick fill the Valley, representing many years of granite bedrock erosion. The soil and rock, called alluvium, consists of granite sand, gravel, and boulders that originate from the surrounding massive granite walls. As granite weathers and breaks away from the cliffs, it reaches the Valley floor as rockfalls and debris flows that strew rocks and boulders, called talus, along the base of the Valley walls. The talus eventually breaks down to fine gravel and sand that are transported and redeposited by rivers and streams.

Geologic Hazards

Seismicity. The Sierra Nevada range near Yosemite National Park is not an area of particularly high seismic activity. No active or potentially active faults traverse the mountain region of the park (California Division of Mines and Geology 1990). However, it is possible that Yosemite could experience seismic shaking associated with earthquakes on fault zones to the east and west margins of the Sierra Nevada (NPS 2000a). Most people would likely feel ground shaking, but structural damage would be negligible to slight in buildings constructed according to modern building standards.

The most notable earthquake recorded in Yosemite was the Owens Valley earthquake of March 26, 1872. This magnitude 7.6 earthquake was one of the largest earthquakes in U.S. history, which reportedly caused damage in Sacramento and San Joaquin Valleys and caused significant rockfalls in Yosemite Valley (McNutt et al. 1991). Famed writer and naturalist John Muir, who was in Yosemite Valley when the Owens Valley earthquake occurred, felt ground shaking strong enough to make standing difficult and to awaken people. Muir also described rocks falling from the granite cliffs minutes after the earthquake that diverted the creeks and rivers and knocked down large trees (Muir 1901).

Rockfall. Rockfalls are the principal geologic hazard in Yosemite Valley. Most rockfalls are associated with triggering events such as earthquakes, rainstorms, or periods of warming with rapid snowmelt. However, some rockfalls occur without a direct correlation to an obvious triggering event; these are probably due to processes associated with gradual stress release and exfoliation of granite rock (Wieczorek et al. 1995 as in NPS 2000a). Rockfalls in Yosemite range in size from small individual blocks of less than one cubic meter to rock avalanches of several million cubic meters. All such events pose a potential hazard; even a rapidly moving small boulder can cause serious injury to people, vehicles, or buildings (NPS 2000a).

Rockfalls affect areas or "zones" at the cliff base. The *base of talus zone* is the area closest to the Valley walls where the majority of rockfall debris accumulates. The *shadow line zone* extends out from the talus slope zone and is the area in which rocks can travel out, away from the cliff. These

zones are shown in figure III-1. The surface areas contained in these zones vary depending on the location and characteristics of the cliff face and the condition of the granite. There are locations where the base of talus zone extends farther toward the Merced River than the shadow line zone. These locations are usually areas of debris flow deposits (NPS 2000a).

The National Park Service has developed the *Geologic Hazard Guidelines* to assist in determining whether certain facilities should be relocated in hazardous geologic areas. The National Park Service classifies buildings as essential (fire station, medical clinic), hazardous (fuel storage), special occupancy (assembly facilities that accommodate less than 300 people), standard occupancy (assembly facilities that accommodate more than 300 people), and miscellaneous facilities (campgrounds, restrooms, and storage buildings). Certain building types (e.g., essential facilities) must be located outside the base of talus zone, while miscellaneous facilities (e.g., restrooms and campgrounds) can be placed adjacent to a cliff within the base of talus zone. The National Park Service uses the *Geologic Hazard Guidelines* to plan new buildings and facilities and to make management decisions regarding facility relocation.

Soils

Yosemite Valley soil depths range from zero on the bedrock at the Valley rim to estimated depths of 1,960 feet near the center of the Valley. The Natural Resource Conservation Service has identified about 42 soil types in Yosemite Valley, ranging from fine clay to fine gravel. Most soils have a relatively undeveloped profile, indicating their relatively recent origin and young geologic age (NPS 2000a). During flood events, water erodes soil material from some areas and deposits other material over the floodplain. The active flooding builds river terraces of fine- to coarse-textured sands. Older riverbeds made up of boulders and gravel become buried under the terrace soils. *Residual* soils are scattered throughout the Valley where bedrock weathering has occurred. *Glacial* soils are principally associated with terminal moraines (material accumulated in a low ridge due to an ancient, retreating glacier). *Colluvial* soils have developed on the talus slopes along the edge of the Valley floor.

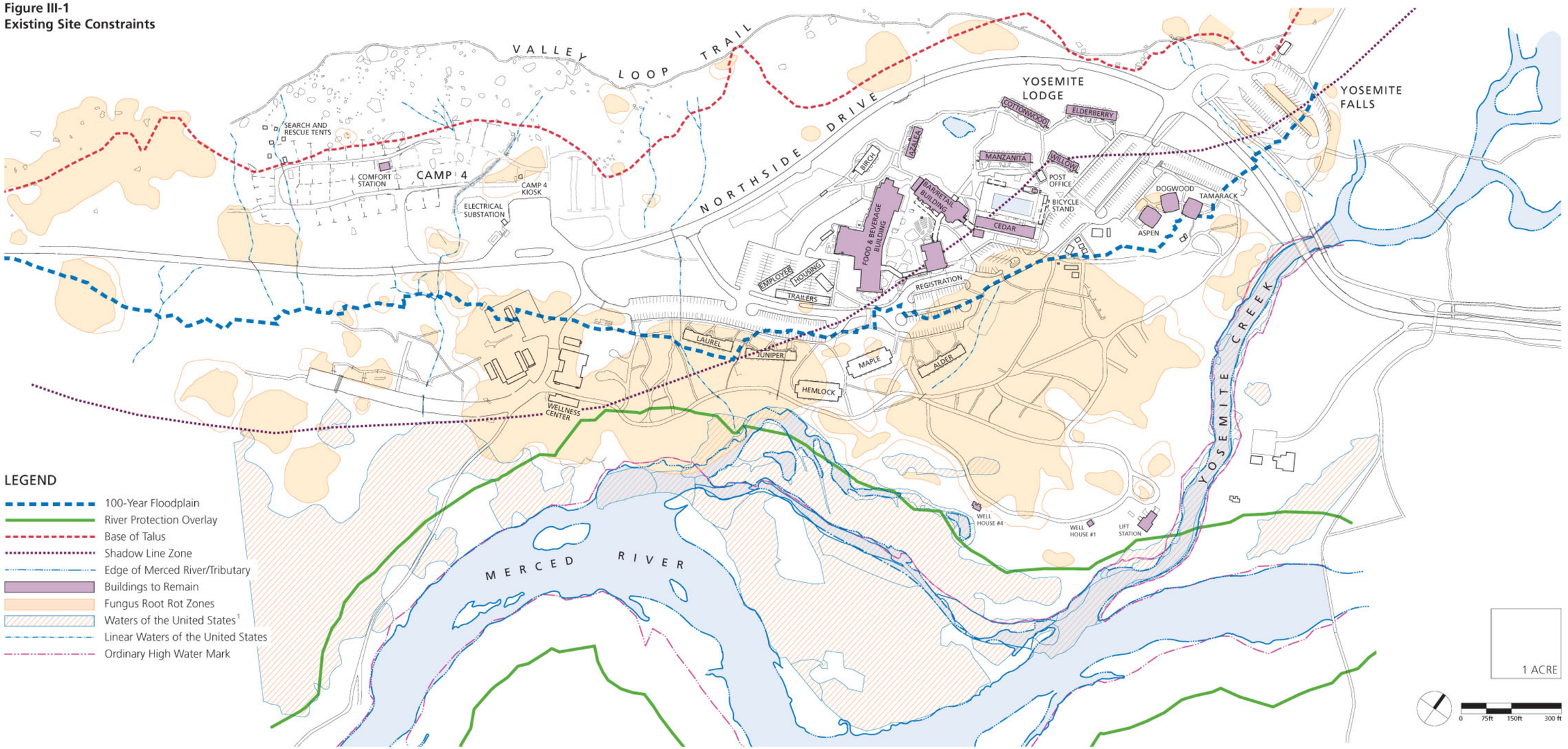
The National Park Service identifies certain soil types in the park as highly valued resources. Designation as a highly valued resource is based on the potential of the soil to restore highly valued vegetation communities; protection by federal laws (such as hydric soils, which are protected because they form in wetlands); and significance as a sensitive area (such as soils that take an inordinately long time to recover after disturbance).

Project Setting

Yosemite Lodge Area Redevelopment site, located between the Merced River and the base of sheer granite cliffs flanking Yosemite Falls, straddles the river floodplain and the boulder-strewn alluvial slope—two distinct geologic environments of Yosemite Valley. Fine-grained, partially consolidated sands and gravels deposited by flow of the Merced River support the south side of the Lodge complex; towards the north, these sediments become interfingered with coarser grained colluvium and talus consisting of granite cobbles and boulders.

Earthquake response at the Lodge varies depending on the underlying materials: low-density, fine grained sediments can amplify seismic waves, while bedrock attenuates and dampens wave propagation. The unique setting of the Yosemite Lodge Area Redevelopment site exposes the Lodge facilities to erosion, soil compaction, and bank failure along the riverside and to rockfall

Figure III-1
Existing Site Constraints



SOURCE: National Park Service

1. Cowardin wetlands cover an equivalent area to the wetland area shown for Waters of the United States.

hazards within the base of talus zone and shadow line zone. As shown in figure III-1, the base of talus zone extends along the base of the cliffs between the shear granite cliffs and Camp 4. Depending on slope conditions and predicted rockfall hazard conditions, the base of talus zone jogs in and out from the cliffs. The proposed Indian Cultural Center site lies within the base of talus zone. The shadow line zone is set away from the cliffs towards the center of the Valley and extends through the Yosemite Lodge Area Redevelopment site. Most facilities at the project site are located between the base of talus zone and the shadow line zone. The National Park Service classifies all existing Yosemite Lodge buildings as standard occupancy, except for the restaurants, which are special-occupancy facilities. Camp 4 and the search and rescue site are classified as miscellaneous facilities. While earthquakes and rockfalls are not predicable and are unavoidable in a natural setting such as Yosemite Valley, responsible facility placement, proper construction, and reliable excavation plans reduce the level of geologic hazard.

Distinct soils form on the Valley alluvium and granite colluvium deposited from the cliffs. Four soil types represent the soil regime at the Yosemite Lodge Area Redevelopment site. Gravelly Alluvial Sand (0 to 3% slopes) and Dinky Like Stony Loamy Sand (8 to 15% slopes) cover areas north of the river. El Capitan Fine Sandy Loam (0 to 3% slopes) and Leidig Loamy Very Fine Sand (0 to 3% slopes) form upon and cover the floodplain adjacent to the Merced River. These soils are considered resilient soils because they are capable of withstanding alteration without permanent deformation and tend to recover more quickly from alteration. The National Park Service considers the floodplain soils to be highly valued resources and has identified areas containing these soils for protection and restoration. Overuse and trampling by park visitors cause sensitive floodplain soils to compact, which leads to accelerated runoff and erosion.

Floodplains and Water Resources

Regional Setting

Hydrology

The Merced River begins in the park's southern peaks, primarily the Cathedral and Clark Ranges, and drains an area of approximately 511 square miles. The main stem of the Merced River flows from the crest of the Sierra Nevada through Yosemite Valley and down to the San Joaquin Valley of California. Discharge in the river, measured at the Pohono Bridge gauging station at the west end of Yosemite Valley, has ranged from a high of about 25,000 cubic feet per second to a low of less than 10 cubic feet per second. The mean daily discharge is about 600 cubic feet per second (NPS 2000a).

Glaciation carved a wide, U-shaped valley that extends westward to a location near the Pohono Bridge. Following glacial retreat, a prehistoric lake developed and eventually filled with sediment between the El Capitan moraine upstream and Happy Isles. The resulting Valley floor has a very mild slope and is responsible for the meandering pattern of the present-day river. The Merced River through most of Yosemite Valley is an alluvial river; the bed and banks contain fine-grained sediments, cobbles, and soil layers, the same materials that are transported by the river. Natural erosion and deposition processes cause the river channel to migrate, often over an extensive area.

Surface water and groundwater function together in Yosemite Valley. The entire meadow system can become saturated to the forest edge, resulting in restricted tree growth that defines the forest/meadow boundaries and extensive Valley wetlands. Groundwater is used in the Valley for

domestic water supplies. Four groundwater production wells in Yosemite Valley produce approximately 1,400 gallons per minute (NPS 2000a).

Affect of Bridges on Hydrology. Eleven bridges cross the Merced River between Happy Isles and the Pohono Bridge. Many of these bridges locally influence the width, location, and velocity of the river. The National Park Service (1991a) and Milestone (1978) found constriction of the river at all of these bridge sites (NPS 2000a).

The dynamic nature of the Merced River makes coexistence with stationary bridges problematic because bridges can alter the morphology of the river by changing the rate, depth, and velocity of flow close to the structure. Bridges constrict flow area because they rarely span the entire floodplain width of the river and generally do not even span the entire natural channel (NPS 2000a). During floods, portions of the river that would normally flow into floodplain areas flow under the structure, increasing the amount of channel discharge. The effect of these seemingly minor, flow-related changes can be profound, both upstream and downstream of the bridge. The higher discharge and reduced flow can cause a backwater effect (i.e., a deep, slow-velocity area) to form upstream and high velocities to occur near and under the bridge opening (NPS 2000a).

Water Quality

Surface Water. The State of California considers most of the Yosemite National Park's surface water to be beneficial for wildlife habitat, freshwater habitat, and for canoeing, rafting, and other recreation (RWQCB 1998). Surface water in most of the Merced River basin is diluted (lacking in dissolved solids), making the ecosystem sensitive to human disturbances and pollution (Clow et al. 1996). Studies have indicated a presence of *Giardia lamblia* and fecal coliform in various surface waters throughout the park, thereby limiting direct consumption of surface water by humans (Williamson et al. 1996b; NPS 2000a).

Stormwater runoff from roads and parking lots may potentially affect water quality. A small portion of stormwater runoff from parking lots in Yosemite Valley is diverted into the wastewater drains and treated at the El Portal Wastewater Treatment Plant. Direct runoff of oil, grease, rubber particles, metals, and other road deposits from most roadways and parking lots discharge directly or indirectly to the Merced River or its tributaries in the Valley. Regional air pollution can also affect water resources in the park through particulate deposition and polluted precipitation. The entire Sierra Nevada range is sensitive to acid precipitation due to its granite substrate and the resulting low buffering capacity of its water resources. Ongoing studies are examining the effects of air pollutants generated both outside and inside the park on natural resources, including surface water resources (NPS 2000a).

Extensive and concentrated visitor use has affected water quality in popular areas along the Merced River. Heavy use along streambanks induces bank erosion through the loss of vegetative cover and soil compaction. Bank erosion can widen the river channel and result in loss of riparian and meadow floodplain areas. Water quality is then altered through increased suspended sediments due to erosion, higher water temperatures from a lack of shade once provided by riparian vegetation, and lower dissolved oxygen levels due to elevated temperatures and shallower river depths (NPS 2000a).

Groundwater. Groundwater is generally of good quality in the Merced River basin and is the sole source of potable water for Yosemite Valley. There are locations in Yosemite Valley where naturally occurring, relatively high iron concentrations in groundwater result in reddish deposits on the ground surface (Williamson et al. 1996a), but these are not a threat to water quality. Federal regulations require that potable water systems that rely on groundwater be continually monitored and operated within set levels for turbidity, waterborne pathogens, and other potential pollutants (NPS 2000a).

Floodplains

The Merced River floodplain was formed over thousands of years of flooding in the Valley; its purpose is to accommodate over-bank flows when the river reaches flood stage. The floodplain is an integral part of the Merced River system and is necessary to preserve the natural flow regime. Additionally, flood waters improve the ecosystem of the floodplain by periodically depositing fine sediments that provide nutrients to the overlying soils and vegetation.

Eleven winter floods since 1916 have caused substantial damage to property in the Merced River watershed. All of these floods took place between November 1 and January 30. The largest floods occurred in 1937, 1950, 1955, and 1997. Flows were in the range of 22,000 to 25,000 cubic feet per second, as measured at the Pohono Bridge gauging station in Yosemite Valley. These floods were caused by warm winter rains falling on snow at elevations up to 8,600 feet (e.g., Tuolumne Meadows), partially melting the accumulated snowpack.

The 100-year floodplain is the area that water inundates during a 100-year flood, or the annual peak flow that has a 1% chance of being equaled or exceeded in any given year. Following the January 1997 flood, National Park Service staff mapped the actual extent of the flood inundation in Yosemite Valley and the U.S. Geological Survey determined actual flood flow rates at the Pohono and Happy Isles gauging stations. These data were used to calibrate the flood frequency analysis (i.e., the predicted flow rate of a 100-year flood) and the flood inundation models (i.e., the predicted area that will be inundated by a 100-year flood) for Yosemite Valley (NPS 2000a).

For the section of the Merced River from Swinging Bridge to Pohono Bridge, the extent of the January 1997 flood, as mapped by the National Park Service, is the best available data for the 100-year floodplain. Tenaya Creek serves as a backwater area for flood waters associated with the section of the Merced River between Happy Isles and Housekeeping Bridge. Indian Creek and Yosemite Creek serve as backwater areas for flood waters associated with the Merced River between Housekeeping Bridge and Swinging Bridge.

Existing facilities in Yosemite Valley that are partly or entirely within the 100-year floodplain include all the campgrounds east of Yosemite Village, several employee residences at Yosemite Village, the historic Superintendent's House (Residence 1), various structures and utilities at Yosemite Lodge, bridges and footbridges across the Merced and its tributaries, restrooms at Happy Isles, and utility corridors.

Floodplain Characteristics. The character of the floodplain varies in different locations in Yosemite Valley due to local hydraulic controls (NPS 2000a). As a tool to understand why different portions of the Merced River in Yosemite Valley reacted differently to the 1997 flood, a study divided the river into five reaches with similar geology and hydrology (NPS 1997a). Reaches 1 and 2 extend upstream from El Portal to the El Capitan moraine. Reach 3 extends upstream

from the El Capitan moraine to Housekeeping Camp, and Reaches 4 and 5 extend upstream from Housekeeping Camp to the narrow reaches of Tenaya Creek and the upper Merced River (NPS 1997a). In Reach 3, the central chamber of Yosemite Valley, flood waters become impounded behind the El Capitan moraine, which acts as a natural "check dam" during flood events and is the hydraulic control for this reach (NPS 1997a). During floods, flow velocities in this reach are low due to the increased depth and area of the water impounded behind the moraine. Upstream and downstream of Reach 3, the Valley is steeper and more constricted, and these areas are subject to higher velocity flood flow (NPS 1997a).

Frazil Ice Flooding. Waterfalls in the park occasionally produce late-winter and early-spring frazil ice at the base of the falls. Frazil ice is slush formed from small ice crystals that develop in turbulent super-cooled stream water when the air temperature suddenly drops below freezing. Although frazil ice lacks the erosional force of regular stream ice, it can cause streams to overflow their banks and change course.

Project Setting

Hydrology

The Yosemite Lodge Area Redevelopment site is located in the relatively broad "central chamber" of Yosemite Valley, along the reach of the Merced River that extends from El Capitan moraine to Housekeeping Camp. The Valley is flat and wide in this area, and the river meanders across a well-developed floodplain. The riverbed consists of sand, gravel, and cobble materials (NPS 1997a).

Yosemite Creek, which flows along the east side of the project site, descends precipitously to the Valley via the Upper and Lower Yosemite Falls and proceeds south through the alluvial fan at the base of the fall to its confluence with the Merced River southeast of Yosemite Lodge. Upon reaching the Valley floor, water flows through a narrow boulder-laden gorge and into a main flow channel. The main channel carries the flow across the top of the alluvial fan until braided stream channels in the fan divert the flow to the south. These channels converge towards the lower part of the fan into four streams that eventually join into one main streamcourse that carries flow under Northside Drive and into the Merced River. Water flow over the alluvial fan depends on the season and the amount of surface water runoff. During periods of heavy spring runoff, water can cover the unchannelized portions of the alluvial fan and occupy nearly all the channels within the braided stream system. In seasons of low flow, such as late summer or mid-winter, water may occupy one or two of the prominent channels, leaving the other channels with no flow or containing pooled water. During periods of high flows, there are few areas on the alluvial fan not inundated with flood flow (Weaver 1992, as cited in NPS 2000a).

National Park Service documents dating from the early 1900s indicate ongoing interest in bank erosion and river meandering in the project area. The National Park Service placed revetment structures (riprap and similar reinforcements) along the banks of Yosemite Creek and the Merced River in attempts to limit erosion and the lateral migration of the stream channels (Milestone 1978). These bank stabilization measures have been used in Yosemite Valley for many years. Revetment structures typically consist of large rocks, called riprap, that are placed at vulnerable locations along the riverbank. The revetments aid in reducing the energy of flowing water and diverting the water away from the bank to reduce erosion, scour, and bank undercutting. However, revetments can often lead to adverse downstream effects by altering

flow, thus increasing the turbulence and flow velocity or focusing water to an unprotected, downstream area. River currents can also undermine revetments. Riprap revetments change the natural flow of the river and lead to accelerated erosion and bank destabilization.

Currently, storm drainage and snowmelt are conveyed to Yosemite Creek and the Merced River through several drainage routes in a variety of conveyance structures (shallow ditches, culverts, and pipes).

Floodplain

Developed areas of Yosemite Lodge have periodically been subject to flooding. Following a flood in 1950, the National Park Service placed earthen fill to raise some cabins at Yosemite Lodge about two and a half feet (from an elevation of 3,956.5 feet to 3,959 feet). In 1951, the Yosemite Park and Curry Company requested that the National Park Service place extensive riprap and construct a dike along Yosemite Creek to protect Yosemite Lodge from flooding (Milestone 1978). However, the National Park Service decided that construction of a dike along the flat Valley floor was impractical and contrary to management policies (Milestone 1978).

Throughout Yosemite Valley, there are examples of flow diversion structures installed to manipulate river flows to prevent flooding and protect facilities. One such diversion, located at the confluence of Yosemite Creek and the Merced River, was installed to divert high flood flows through an overflow channel and away from guest lodging units in the lower portion of the Yosemite Lodge Area Redevelopment site. Referred to as a diversion dam, this human-made structure is constructed with rock and soil along the northern riverbank to a height capable of diverting high flows. The presence of this structure may have reduced flood damage during the January 1997 flood.

Following the 1997 flood, the National Park Service determined that a number of Yosemite Lodge cabins were located within the 10-, 20-, 50-, and 100-year floodplains (NPS 1997a). Many of these structures were irreparably damaged and subsequently removed.

In an analysis of hydrologic, hydraulic, and geomorphic attributes of the 1997 flood, investigators found “few readily observable changes to the river channel, floodplain, or riparian vegetation in this reach.” The analysis concluded that impacts to infrastructure stemmed primarily from inundation and rafting of unsecured floatable objects. For structures such as bridges and roads, there was “very little consequence stemming from inundation in the absence of significant velocity.” Investigators also noted that “even floating trees and other large woody debris caused no significant damage to bridges because flow velocities were so low. In general and for the same reason, buildings also realized little structural damage from flowing water or debris…” (Madej et al. 1997).

This finding is consistent with a 1937 flood damage report stating that “a remarkable feature of the storm was that the greatest damage resulted from effects of high water on the things that man had constructed rather than violent changes to the physical features” (Milestone 1978).

Current Development in the Floodplain. Since the 1997 flood, the visitor cabins, two multi-unit cottages, employee housing, and several other structures have been removed from the 100-year floodplain at Yosemite Lodge (see figure III-1). Facilities currently located in the 100-year floodplain include four motel-type buildings (Maple, Alder, Hemlock, and Juniper), an employee

Wellness Center, Yosemite Lodge housekeeping facilities, several small structures near Tamarack Cottage, a section of Northside Drive west of Yosemite Creek Bridge, Yosemite Creek Bridge and Yosemite Creek Pedestrian/Bicycle Bridge, Yosemite Lodge roadways, and utilities. Utilities within the 100-year floodplain include three groundwater wells that provide drinking water in the Valley, the Yosemite Creek wastewater lift station, and sewer, water, and electricity lines.

Wetlands

Regional Setting

Wetlands are transitional areas between terrestrial and aquatic ecosystems, where the water table is usually at or near the surface of the land. Wetlands have many distinguishing features, the most notable of which are unique soils, saturated for at least part of the year, and vegetation that has adapted to or is tolerant of saturated soils. Wetlands are considered highly valued resources because they perform a variety of hydrological and ecological functions vital to ecosystem integrity.

Wetland Classification

The National Park Service classifies and maps wetlands using the Cowardin classification system (USFWS 1979). This system classifies wetlands based on vegetative lifeform, flooding regime, and substrate material. For purposes of this document, these wetland types are referred to as Cowardin wetlands. These wetlands are subject to the National Park Service protection policies under Executive Order 11990.

Waters of the U.S., including wetlands, streams, rivers, and natural drainages, are features delineated and classified under Section 404 of the Clean Water Act and are regulated under the jurisdiction of the U.S. Army Corps of Engineers. Wetlands are a subset of waters of the U.S. and are defined under the Clean Water Act as: “Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 Code of Federal Regulations 328.3[b]). Streams, creeks, rivers and natural drainages that are regulated under Section 404 of the Clean Water Act are defined as “other waters of the U.S.” and are referred to as such in this document. For purposes of this document, wetland waters of the U.S. and other waters of the U.S. are referred to collectively as waters of the U.S, unless noted otherwise. Additionally, both waters of the U.S. and Cowardin wetlands are referred to as wetlands.

Cowardin wetlands include waters of the U.S., but may also include certain nonvegetated sites and sites lacking hydric soil, if they meet specific criteria in the Cowardin classification system.

Wetland Types and Extent

Table III-1 presents the total extent of palustrine and riverine wetland acreage in Yosemite Valley (NPS 2000a).

Table III-1
Wetland Types in Yosemite Valley

Wetland Type	Definition	Acreage
Riverine	All wetland and deepwater habitats contained within a river channel, except wetlands dominated by trees, shrubs, persistent emergent mosses, or lichens.	120
Palustrine emergent	Meadows, marshes, and vegetated ponds. Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes that are usually present for most of the growing season.	420
Palustrine forested	Riparian forest habitats that are regularly inundated by normal high-water flows or flood flows. The dominant woody vegetation is at least 20 feet tall.	185
Palustrine scrub shrub	Areas dominated by woody vegetation less than 20 feet tall, such as willows.	271
Total		**996**

SOURCE: NPS 2000a

Project Setting

A wetland survey of the project site was completed to delineate and identify Cowardin wetlands and waters of the U.S. (Jones and Stokes 2002).

The project site supports a total of 709,255 square feet (16.28 acres) of waters of the U.S. (see figure III-1). Using the Cowardin classification system, these wetlands are classified as riverine and palustrine habitats. The extent of waters of the U.S. is equivalent to the extent of Cowardin wetlands in the project site. Therefore, wetlands identified in the project site are regulated under Sections 401 and 404 of the Clean Water Act and the National Park Service protection policies under Executive Order 11990 and Director's Order 77-1.

Numerous wetlands cover the floodplain south of the existing multi-use paved trail. These wetlands are classified as palustrine emergent, palustrine scrub shrub, and palustrine forested. Wetlands in the floodplain are identified as highly valued natural resources. Excepting Yosemite Creek, other waters of the U.S. (i.e., riverine intermittent drainages) are located primarily within the western portion of the project site.

Yosemite Creek lies in the eastern portion of the project site and is a tributary to the Merced River. The west bank of Yosemite Creek supports several wetlands classified primarily as palustrine emergent wetland and palustrine forested wetland. Using the Cowardin system, Yosemite Creek is classified as riverine upper perennial unconsolidated bottom. Yosemite Creek and its associated instream wetlands are subject to the National Park Service protection policies under Executive Order 11990 as Cowardin wetlands. Additionally, Yosemite Creek is regulated as other waters of the U.S., and its associated instream wetlands are regulated as wetland waters of the U.S. under the jurisdiction of the U.S. Army Corps of Engineers under Sections 401 and 404 of the Clean Water Act.

The project site supports numerous riverine intermittent drainages (other waters of the U.S.), located primarily in the western portion of the site (figure III-1). Almost all riverine intermittent drainages[1] within the project site are classified as Cowardin wetlands and waters of the U.S. These drainages have a nonsoil substrate that is saturated and/or covered by shallow water at some time during the growing season. These wetlands are typically narrow, encompassing the bottom portion of the creekbeds. Very little wetland vegetation is found in these areas because of the intermittent nature of the flows within the drainage channels. All above-ground drainages within the project site are subject to the National Park Service protection policies under Executive Order 11990. These drainages are classified as other waters of the U.S. and are subject to Sections 401 and 404 of the Clean Water Act.

Vegetation

Regional Setting

Yosemite National Park supports five major vegetation zones: chaparral/oak woodland, lower montane, upper montane, subalpine, and alpine. Yosemite Valley lies within the lower montane mixed conifer zone, where 41 vegetation types have been identified (NPS 2000a). These have been loosely lumped into five groupings: upland, California black oak, meadow/floodplain, riparian, and other communities outside of the Valley. For the purposes of this document, only communities in Yosemite Valley, including upland, California black oak, meadow/floodplain, riparian, are described.

Upland plant communities are found where soil moisture conditions are average to dry, and where soils are not periodically flooded or saturated. In Yosemite Valley these communities fall into the categories of mixed conifer, California black oak, canyon live oak, and cliff (talus). Due to the ecological and cultural value as well as the sensitivity of the California black oak community, this community has been removed from the upland category and is evaluated separately throughout this document. Upland plant communities dominate about 75% of Yosemite Valley. They have undergone alterations through changes in fire frequency, spread of fungus root rot, and establishment of non-native species. California black oak communities are considered a highly valued natural and cultural resource in Yosemite Valley due to declines in population size, vigor, and recruitment rates. California black oak acorn was a primary food source of American Indians in Yosemite Valley, and most of the large groves continue to be used as traditional gathering areas today. The meadow/floodplains in Yosemite Valley play a particularly critical role in the Merced River ecosystem. Meadow communities in Yosemite Valley are considered highly valued resources. Riparian communities are among the most productive, sensitive, and biologically diverse in Yosemite Valley (NPS 2000a).

Fungus root rot diseases (annosus and armillaria) primarily affect upland plant communities and California black oak communities. Annosus root disease is a widespread native fungus occurring throughout northern Europe and western North America in coniferous upland forests. In Yosemite Valley, the large size of annosus root disease centers is unusual; only a few other large population centers of this species occur on the western side of the Sierra Nevada. Annosus root disease flourishes in Yosemite Valley, due to dense stands of large trees on a sandy floor, a high water table, and frequent flooding. The conifer forest in Yosemite Valley may not be sustainable

[1] For the purpose of this study, drainages include features that are connected to natural drainages, including rivers, streams, natural drainages, and modified natural drainages that are constructed in former wetland areas.

because of these large centers of annosus that have developed within the unnaturally dense stands of conifers in former California black oak, meadow, and riparian areas (NPS 2000a). Several centers of significant annosus infestation are present in the Valley today, including in portions of the Yosemite Lodge area. Armillaria species are fungi that attack the root and crown of hardwoods and conifers of all ages. These fungi can be found on nearly every California black oak in Yosemite Valley. Armillaria can kill disturbed or severely stressed oaks and is apparently favored by high levels of soil moisture during the summer. Summer watering of California black oaks in landscaped areas has contributed to the overall decline of this community in Yosemite Valley (NPS 2000a).

Non-native plant species occur to some extent in each of the communities. Non-native species can alter the composition of Valley meadows, out-compete native species, and could reduce regional species diversity. Control and preventive measures are in place for many non-native species. These species are the result of either deliberate or accidental introductions and are not part of the naturally evolved community (NPS 2000a). Typical non-native species in the Valley include European annual grasses and bull thistle.

Project Setting

Plant communities within the project site fall into two categories: natural and developed (NPS 1994b, 2001a). Natural plant communities are those that have historically existed without human intervention. There are 10 plant communities in the project area, including 5 natural upland communities (open ponderosa pine/California black oak woodland, ponderosa pine forest, dense mixed coniferous forest, south-facing mixed conifer/canyon live oak forest, and California black oak woodland), two meadow/floodplain communities (carex wet meadow and grass/sedge meadow), and four riparian communities (sandbar willow woodland, dense cottonwood/willow forest, conifer corridor, and oxbow and cutoff channels) within the project site.

Developed plant communities are those that have been physically altered due to human intervention (including, but not limited to, fire suppression, trampling, altered hydrologic conditions) or developed for landscaping purposes by humans. The project area includes five developed upland communities: bare ground, developed open area–sparse vegetation, developed ponderosa pine forest, developed black oak woodland, and impacted conifer corridor. Developed upland plant communities cover the largest area in the project site, with incense-cedar being the dominant plant species. Approximately 4,662 trees are located on the Yosemite Lodge Area Redevelopment site.

Of the natural and developed plant communities, only California black oak woodland is considered a highly valued resource in the upland area. Within the floodplain, all meadow/floodplain and riparian communities are considered highly valued resources. As stated earlier, this community is also considered a cultural resource.

Figure III-1 depicts the underground extent of fungus root rot zones. The floodplain area, south of most of the existing structures, supports the largest extent of fungus root rot. Zones of root rot have been defined by above-ground signs and symptoms, including stumps with probable annosus or armillaria decay, uprooted trees with decay, standing dead trees, tree crowns with symptoms of decline indicating root decay, and data from gap boundaries delineated in 1971. The fungus may not be actively infecting and killing all trees denoted in the mapped zone. Because the

removal of a root rot disease is not possible, the National Park Service is managing the disease through prescriptions that include tree removal, revegetation, construction, and/or soil management (NPS 1998c).

Upland Areas

The Yosemite Lodge site supports four developed upland communities (including developed open area–sparse vegetation, bare ground, developed ponderosa pine forest, and developed black oak woodland) and five natural upland communities (including open ponderosa pine/California black oak woodland, dense mixed coniferous forest, California black oak woodland, south-facing mixed conifer/canyon live oak forest, and ponderosa pine forest).

Developed open area–sparse vegetation is the dominant upland community at the Yosemite Lodge area. Most of the vegetation was planted as landscape vegetation, while other vegetation naturalized within the developed area. Dogwood, white alder, incense-cedar, ponderosa pine, and manzanita are sparsely distributed around the existing buildings and facilities. This landscaped vegetation represents a native mix of riparian, conifer, and chaparral species.

Occasional naturalized stands of incense-cedars and ponderosa pines form small, isolated patches between buildings, such as between the Hemlock and Juniper buildings, as well as around the maintenance area. Incense-cedar has invaded much of the area due to nearly 100 years of fire suppression, which has changed forests from open to dense thickets of shade-tolerant species. As a result, incense-cedar is highly managed through mechanical removal within developed areas of the Valley.

Bare ground covers the maintenance area as well as a small area near a parking lot north of the Wellness Center. Herbaceous species sparsely cover bare ground in open areas within the Yosemite Lodge area. Dominant species observed in these areas include gayophytum, lessingia, and European annual grasses. A small patch of developed black oak woodland surrounds the Wellness Center. California black oak is the dominant species in this community, and incense-cedar occurs as an associate species. The area west of the housekeeping area supports open ponderosa pine/California black oak woodland and ponderosa pine forest.

Traversing east to west, the area north of Northside Drive supports open ponderosa pine/California black oak woodland, ponderosa pine forest, developed open area–sparse vegetation, California black oak woodland, developed ponderosa pine forest, dense mixed coniferous forest, and south-facing mixed conifer/canyon live oak forest. The Camp 4 area supports developed open area–sparse vegetation, which is primarily composed of numerous sparsely distributed incense-cedars. This site has been previously disturbed based on the presence of exposed bare ground, European annual grasses, and herbaceous species, including gayophytum and lessingia, that favor disturbed open areas. Small, isolated patches of fungus root rot are present in the immediate area east and south of Camp 4. The area east of Camp 4 supports open ponderosa pine/California black oak woodland, ponderosa pine forest, and developed open area–sparse vegetation (sparsely distributed incense-cedar). These communities are fairly open and support European annual grasses and herbaceous species in the understory.

Incense-cedar is the dominant species within dense mixed coniferous forest at the area west of Camp 4 (where the Indian Cultural Center is proposed). This site also supports a large stand of developed ponderosa pine forest, a small patch of California black oak woodland, and south-

facing mixed conifer/canyon live oak forest (which is present on the cliff). This site has been previously disturbed by former development.

Floodplain

The undeveloped portion of the floodplain area supports two developed upland communities, four natural riparian communities, and two natural meadow communities.

Upland areas support developed open area–sparse vegetation (where primarily ponderosa pine and incense-cedar were observed), ponderosa pine forest, impacted conifer corridor, and conifer corridor. These communities have undergone alterations through changes in fire frequency, spread of fungus root rot, and establishment of non-native species. Incense-cedar and ponderosa pine form unnaturally large stands due to the lack of fire and modified hydrology. As a result, conifers invade meadows, riparian areas, and oak woodlands.

Riparian areas in the floodplain are situated at the interface between terrestrial and aquatic ecosystems. These areas support sandbar willow woodland, dense cottonwood/willow forest, conifer corridor, and oxbow and cutoff channels. Typically, riparian vegetation is regularly disturbed by the deposition and removal of soil and the force of flood waters and readily colonizes newly formed river-edge deposits. However, because of the lack of fire and modified hydrology, conifers have also invaded riparian areas.

Meadow communities, including carex wet meadow and grass/sedge meadow, intergrade with riparian communities near the Merced River and Yosemite Creek within the project area. Many historic meadows have been converted to upland vegetation types or no longer exhibit meadow characteristics due to development. Due to the lack of fire, altered hydrologic conditions, and encroachment of conifers, meadows within the project area have been altered.

Yosemite Creek supports sparsely distributed white alder on the east bank and sparsely distributed incense-cedar and alder on the west bank. Sedges lie instream of Yosemite Creek. Riprap covers several areas along the west bank. Vegetation along Yosemite Creek at the Yosemite Creek Pedestrian/Bicycle Bridge consists of conifer corridor, including white alder, canyon live oak, incense-cedar, and California black oak.

Wildlife

Regional Setting

Wildlife in Yosemite National Park is diverse and abundant, reflecting the wide range of Sierra Nevada habitats in relatively intact condition. Concentrated areas of human use in Yosemite National Park have affected wildlife and their habitats, especially in east Yosemite Valley. Montane meadow and riparian areas within Yosemite National Park are highly productive, structurally diverse habitats that support a high level of species diversity and provide important linkages between terrestrial and aquatic communities. The long history of development and human use in the Valley has resulted in fragmentation and reduction of these habitats, affecting their quality to wildlife (NPS 2000a). In addition, the introduction of non-native species such as trout, brown-headed cowbird, European starling, house sparrow, and bullfrog has resulted in negative effects on native wildlife within the park.

California black oak woodland and upland habitats such as lodgepole pine, montane hardwood, montane hardwood conifer, ponderosa pine, and Sierra mixed conifer woodlands provide roosting habitat for 10 species of bats, and nesting habitat for birds such as acorn woodpecker and great-horned owl. Old-growth coniferous forests with snags support nesting pileated woodpeckers. Acorns produced by oaks provide an abundant food source for wildlife such as western gray squirrel, acorn woodpecker, band-tailed pigeon, mule deer, and black bear (NPS 2000a). Brown creepers, white-headed woodpeckers, Hammond's flycatcher, flammulated owl, and hermit thrush favor shrub habitat within woodlands.

Meadow habitats within Yosemite National Park, such as fresh emergent wetland and wet meadow, support breeding western toads and Pacific tree frogs. These areas provide nesting habitat for birds such as mallards and red-winged blackbirds and provide an important source of green vegetation in summer for herbivores such as mule deer (NPS 2000a). Riparian habitats such as riverine, lacustrine, and montane riparian habitat types support a wide variety of wildlife, including nesting and foraging birds, fish, aquatic insects, and small mammals. Large mammals use riparian vegetation along river channels as a continuous corridor for movement. The quality of urban habitat for wildlife within Yosemite Valley and El Portal is limited by its small size and proximity to human activity. Structures in developed areas can, however, provide nesting or roosting habitat for species such as cliff swallows and several species of bats (NPS 2000a).

Heavy visitation to Yosemite Valley, along with the relatively large number of resident employees, has led to many human/wildlife conflicts involving mammal species such as raccoons, mule deer, and especially black bears. The basis of most of these problems is the availability of human food. Improperly stored food and garbage and deliberate feeding alter the natural behavior of wildlife and lead to property damage and threats to human safety (NPS 2000a). In 2002, more than $85,000 in property damage (559 incidents) was caused by black bears in the park (NPS 2002a).

Project Setting

The primary wildlife habitat type in the Yosemite Lodge Area Redevelopment site is urban. This habitat is comprised primarily of stands of native vegetation interspersed with areas of development, such as campgrounds, parking areas, lodging, and housing areas (NPS 2000a). The high level of ongoing human disturbance, such as human presence and high noise levels from cars and buses, greatly reduces the value of urban habitat for local wildlife.

The Yosemite Lodge as well as large portions of Northside Drive, Camp 4, and the Indian Cultural Center are located within urban habitat. Species considered highly tolerant of human disturbance inhabit this area, including: northern flicker, Stellar's jay, raven, Anna's hummingbird, Bewick's wren, chestnut-backed chickadee, common raven, raccoon, mule deer, coyote, and striped skunk. Many of the human/wildlife conflicts with black bear, raccoons, and other species within the Valley occur in developed areas such as Yosemite Lodge and Camp 4 due to the concentrated human use of these areas and availability of human food.

California black oak woodland and upland habitats, such as ponderosa pine, montane hardwood, Sierra mixed conifer, and montane hardwood conifer woodlands, provide nesting and foraging resources for a variety of wildlife in developed areas at Camp 4 and portions of existing Northside Drive, as well as at the sites proposed for Indian Cultural Center and realigned Northside Drive development. Trees and snags provide nesting habitat for owls and other raptors and roosting habitat for bats, such as pallid bat, fringed myotis bat, long-eared myotis bat, and long-legged

myotis bat. Mammals such as western gray squirrel, Douglas squirrel, mule deer, and black bear may forage on acorns in these woodlands. Peregrine falcons forage over the project area and may nest on high cliff faces northwest of Camp 4 and the proposed Indian Cultural Center site.

Northside Drive is located outside of montane riparian habitat along the Merced River, but traverses through this wildlife habitat type across Yosemite Creek. Wildlife utilizing the Merced River and Yosemite Creek riparian corridors include resident and migratory birds such as song sparrow and warbling vireo. Yellow warbler and barn swallow forage extensively in riparian forest habitats. Riparian areas are also important foraging grounds for aerial and ground-foraging insectivores such as *Myotis* bat species and pallid bats. Mammals such as western harvest mouse, deer mouse, western gray squirrel, and raccoon also utilize streamside habitats for nesting and foraging. Raptors that breed and nest in riparian woodland communities include red-tailed hawk, sharp-shinned hawk, Cooper's hawk, and others.

Fishery resources within the Merced River and other drainages in Yosemite Valley have historically been low in species diversity. All fish species were eliminated from the area during the last period of glaciation, and the numerous waterfalls of the Sierra Nevada prevented subsequent repopulation of the rivers by upstream migration. When the first Euro-American settlers arrived, only the lower reaches of the Tuolumne and Merced Rivers contained substantial fish populations, including native rainbow trout, Sacramento sucker, Sacramento squawfish, hardhead, California roach, and riffle sculpin. Stocking of rainbow trout and brown trout began during the late 1800s and continued until 1978 (NPS 2000a).

Seasonal aquatic habitat within Yosemite Creek provides drinking water for wildlife and may support breeding amphibians and insects. Several factors combine to create suboptimal habitat quality for fishery resources in Yosemite Creek, particularly within the local setting. These include the following: (1) severe climate conditions (i.e., floods, frazil ice, low summer flows); (2) low nutrient availability due to general lack of typical riparian vegetation; (3) shallow channels; and (4) unstable streambanks with limited vegetative cover. Therefore, fish are unlikely to use Yosemite Creek to a significant extent, although the presence of a few riffles with appropriate gravel sizes may sometimes enable trout to spawn in Yosemite Creek during the spring. Smaller species such as riffle sculpin may occupy the channels late into the summer. Human disturbance has eliminated riparian and wetland vegetation along seasonal drainages throughout Camp 4 and the proposed Indian Cultural Center site and has altered the natural structure of these features, reducing their suitability for amphibians and fish.

Special-status Species

Regional Setting

Species Considered

Some species of plants and animals have undergone local, state, or national declines, which has raised concerns about their possible extinction if protective measures are not implemented. As a result, the U.S. Fish and Wildlife Service, California Department of Fish and Game, and Yosemite National Park have established categories of these species that reflect the urgency of their status and the need for monitoring, protection, and implementation of recovery actions (NPS 2000a). Species listed under the Federal Endangered Species Act of 1973, as amended (i.e., listed as threatened or endangered), species listed under the California Endangered Species Act (i.e., those considered endangered, threatened, rare, or of special concern), and species identified as rare by

the National Park Service (i.e., park rare) are considered in this analysis. Collectively, species in these categories are referred to in this document as "special-status species."

The various federal, state, and National Park Service categories for special-status species are described in Appendix D, Special-status Species Evaluation. Appendix D presents federally listed threatened or endangered species and species of concern (former federal category 2 species); state-listed threatened, endangered, and rare species, and species of special concern; and species that are locally rare or threatened. These species are known to be or could be present in Yosemite Valley. Species listed in the table are those that could be affected directly, as well as species that could be affected by radiating impacts associated with changes in human activity (NPS 2000a). The National Park Service analyzed 74 special-status wildlife species and 38 special-status plant species in the *Yosemite Valley Plan*. Detailed information on these species is included in the Biological Assessments for the Merced River Plan and *Yosemite Valley Plan* (incorporated by reference), which are on file at Yosemite National Park.

Project Setting

Species Considered

A total of 74 special-status wildlife species and 38 special-status plant species (112 total) have been considered in the evaluation of this project (see Appendix D, Special-status Species Evaluation). These species were identified based on data gathered from the National Park Service, the U.S. Fish and Wildlife Service, and the California Natural Diversity Data Base. The National Park Service has determined that 81 of these species are not known or likely to occur in the vicinity of the project area. In addition, preferred habitat for 81 species is also not likely to occur in the vicinity of the project area. The remaining special-status species that have potential habitat within the project area include:

- Bald eagle
- Yosemite Mariposa sideband snail
- Sierra pygmy grasshopper
- Harlequin duck
- Peregrine falcon
- White-headed woodpecker
- Rufous hummingbird
- California spotted owl
- Spotted bat
- Small-footed myotis bat
- Long-eared myotis bat
- Fringed myotis bat
- Long-legged myotis bat
- Yuma myotis bat
- Greater western mastiff bat
- Golden eagle
- Cooper's hawk
- Sharp-shinned hawk
- Willow flycatcher
- Yellow warbler
- Pallid bat
- Pale big-eared bat
- Townsend's big-eared bat
- Rawson's flaming trumpet
- Madera linanthus
- Slender-stalked monkeyflower
- Yosemite popcorn-flower
- Sugar stick
- Boreal bedstraw
- False pimpernel
- Ladies' tresses

Critical Habitat

Critical habitat has not been designated for any federally listed species that is known or has potential to occur within the Yosemite Lodge Area Redevelopment site. Critical habitat for the California red-legged frog was designated by the U.S. Fish and Wildlife Service on March 13, 2001 (Federal Register 2001). In July 2002, a federal judge repealed the ruling over 4 million acres of

habitat; however, critical habitat Unit 5 (Yosemite Unit) remains intact. This area consists of drainages found in the tributaries of the Tuolumne River and Jordan Creek, a tributary to the Merced River, and in Tuolumne and Mariposa Counties, but does not include the project area.

Special-Status Wildlife

Bald Eagle. The bald eagle, a federally listed threatened and state-listed endangered species, breeds or winters throughout most of California. Nesting usually occurs within two miles of lakes, reservoirs, rivers, or large streams that support adequate food resources (USFWS 1986, as cited in NPS 2000a). Most nesting by bald eagles in California occurs from 1,000 to 6,000 feet in elevation, but can occur from sea level up to over 7,000 feet (Jurek 1988, as cited in NPS 2000a). Nest trees in California are most often ponderosa pines in mixed conifer stands. Bald eagles construct up to five nests in a nesting territory and alternate nests in different years (NPS 2000a). The most common prey of bald eagles in the west are fish, waterfowl, rabbits, and various types of carrion (Zeiner et al. 1990, as cited in NPS 2000a). Typically, large bodies of water or rivers with abundant fish, snags, and other perches serve as foraging habitat (NPS 2000a).

The project area is not a primary habitat for bald eagles, and eagles have not been observed nesting in the area or in the Valley. Birds may fly through the area on occasion and forage over the Merced River; however, bald eagles do not depend on the habitat located in and around Yosemite Creek and the reach of the Merced River near the project area.

Yosemite Mariposa Sideband Snail. Yosemite Mariposa sideband snail, a federal species of concern, is a narrowly distributed land snail known from the Glacier Point, Curry Village, and Vernal Fall area of Yosemite, and the Merced River canyon west of El Portal (NPS 2000a). This snail lives in mossy rockslides with a cover of trees or shrubs (NPS 2000a). It prefers stable rather than active rockslides, and rock piles with open crevices rather than those filled with silt. The talus and rockslide habitat at the Indian Cultural Center and above Camp 4 may provide habitat for this species during the winter months.

Sierra Pygmy Grasshopper. Pygmy grasshoppers are often found in riparian areas, particularly in the spring and early summer. This federal species of concern has only been found in a few areas: in the vicinity of El Portal (Rehn and Grant 1956, as cited in NPS 2000a), and in the Sugar Pine area of Madera County at an elevation of 4,300 to 5,000 feet (VOLPE 1997, as cited in NPS 2000a). Suitable habitat for this species is present within and adjacent to the riparian corridor of the Merced River. Yosemite Creek is not likely to support Sierra pygmy grasshopper.

Harlequin Duck. Harlequin duck, a federal species of concern and state species of special concern, winters in marine waters along rocky coasts from San Luis Obispo County north, and breed inland along fast-flowing, shallow rivers and streams. Nests are established near swift rivers or streams in recesses sheltered overhead by streambanks, rocks, woody debris, or low shrubs. Nests are usually within 7 feet of the water, but can be up to 90 feet away. In breeding areas, harlequin ducks feed primarily on invertebrates from the swift, shallow rivers that are its preferred habitat (NPS 2000a).

No observations of harlequin duck were recorded in Yosemite Valley between 1980 and 1999; however, a pair was observed on the Merced River in 2000. Another nesting pair was observed near the confluence of Bridalveil Creek and the Merced River in 2002 (NPS 2002e). Even though this species may have once nested in the Valley, it is not likely to be found in the project area due

to human disturbance/presence. The intermittent nature of and the sparse ground cover around other drainages in the project area also support this conclusion.

Peregrine Falcon. Peregrine falcon, a federal delisted species and state endangered species, forages over a variety of habitats, including wooded areas, meadows, and rivers. The primary prey of peregrine falcons is a variety of bird species, but its prey also includes mammals, insects, and fish. Peregrine falcons have relatively strict nesting requirements: vertical cliff habitat with large potholes or ledges that are inaccessible to land predators. Peregrine falcons may forage over the project area. Although suitable nesting habitat occurs on rock cliffs in the vicinity of Camp 4 and the Indian Cultural Center, the closest known nest site is on the north cliff face of Yosemite Valley near The Ahwahnee, outside of the project area.

White-headed Woodpecker. This federal species of local concern is a resident of montane coniferous forests with large trees and snags within the Warner Mountains and Sierra Nevada, Cascade, Klamath, Transverse, and Peninsular ranges. White-headed woodpeckers are cavity nesters and utilize large snags or stumps in open conifer habitats. The species may forage within project area woodland and upland habitats. Hazard tree removal has likely eliminated suitable nesting habitat in the project area.

Rufous Hummingbird. Rufous hummingbird, a federal species of concern, utilizes open woodlands, riparian areas, chaparral, mountain meadows, and other habitats with nectar-producing flowers. Nests are placed in shrubs, conifers, and riparian tangles near the ground. Forage includes nectar from flowering plants, insects, spiders, and tree sap. The Merced River riparian corridor and project area woodlands and upland habitats provide suitable foraging resources for rufous hummingbird. Flower-bearing plants within these habitats may support foraging rufous hummingbirds during migration; however, this species does not nest in the Sierra Nevada.

California Spotted Owl. California spotted owl, a federal species of concern and state species of special concern, is found throughout the entire Sierra Nevada from the southern Cascades south, and in the central Coast Ranges. California spotted owl habitat varies from oak and ponderosa pine forests to lower elevation red fir forests up to 7,600 feet in elevation (NPS 2000a). Nesting and roosting habitat of spotted owls is typically dense forest, with a canopy closure of greater than 70%. The presence of black oak in the canopy also enhances habitat quality. In the upper Sierra Nevada (over 4,000 feet), prey in mixed coniferous forests is mainly northern flying squirrels.

Surveys conducted in the summer of 2000 did not identify any California spotted owls within the project area. The project area is within the territories of spotted owls in the Valley, and forested areas are likely used as foraging habitat.

Spotted Bat. This federal species of concern and state species of special concern is found in western North America, from British Columbia into Mexico. It lives in desert scrub and open forest areas and roosts in cliff faces and rock crevices. The species forages in a wide variety of habitats, primarily for moths.

There is a significant population of spotted bats in Yosemite Valley (Pierson and Rainey 1995, as cited in NPS 2000a). Auditory bat surveys were conducted in 1993 at 24 stations in Yosemite Valley in four habitats: large open meadows, wetlands, forest, and open ponderosa pine forest. Acoustic surveys detected spotted bats in meadow and wetland habitats only (Pierson and Rainey 1993, as

cited in NPS 2000a). Spotted bats forage on Bridalveil Meadow, Leidig Meadow, Ahwahnee Meadow, and on the north side of El Capitan Meadow, just below El Capitan (Pierson and Rainey 1993, as cited in NPS 2000a). The species was not found in Cook's Meadow or Stoneman Meadow. It is likely that spotted bats roost on or near Half Dome and El Capitan (Pierson and Rainey 1993, as cited in NPS 2000a). This species may also roost in cliff faces and rock crevices northwest of Camp 4 and the Indian Cultural Center.

Small-footed Myotis Bat. Small-footed myotis bat, a federal species of concern, is a common bat of arid uplands in California. It occurs in a wide variety of habitats, primarily in relatively arid, wooded, and brushy uplands near water. This species forages on a variety of small flying insects and is often seen foraging among trees and over water (NPS 2000a). Small-footed myotis bats are known to occur in Yosemite Valley, based on historic records and a specimen at the Museum of Vertebrate Zoology in Berkeley, California. Small-footed myotis bat was not captured during five days of mist netting in Yosemite Valley in 1993, although it was captured in Wawona in 1994 (Pierson and Rainey 1993 and 1995, as cited in NPS 2000a). Roosting and foraging habitat for small-footed myotis bat occurs in woodlands within developed and undeveloped regions of the project area.

Long-eared Myotis Bat. This federal species of concern is found across much of western North America, from British Columbia south to California and New Mexico. The species is found in a wide range of habitats, from the coast to the high Sierra Nevada, and in montane oak woodlands. The species lives in coniferous forests in mountain areas and roosts in small colonies in caves, buildings, and under tree bark. Mist-net bat surveys were conducted in Yosemite Valley in 1993 at Mirror Lake, Cook's Meadow, El Capitan Meadow, and at Yosemite Creek below Yosemite Falls. During the 1993 survey, long-eared myotis bat was captured only at the Yosemite Creek site (Pierson and Rainey 1993, as cited in NPS 2000a). It was also captured in Wawona in 1994. Long-eared myotis bat may occur in riparian habitat along the Merced River and Yosemite Creek, and in woodlands within developed and undeveloped regions of the project area.

Fringed Myotis Bat. This federal species of concern is found in much of California, up to British Columbia, and is scattered across several southwestern states and into Mexico. It is found to at least 6,400 feet in the Sierra Nevada, in deciduous/mixed conifer forests. This species feeds over water, in open habitats, and by gleaning from foliage; it roosts in caves, mines, buildings, and trees, especially large conifer snags. Grinnell and Storer found the fringed myotis bat in 1924 in a location just outside the park boundary. Mist-net bat surveys were conducted in Yosemite Valley in 1993 at Mirror Lake, Cook's Meadow, El Capitan Meadow, and at Yosemite Creek below Yosemite Falls, and fringed myotis bat was captured in Cook's Meadow and the Yosemite Creek site (Pierson and Rainey 1993, as cited in NPS 2000a). It was not found in mist-netting surveys in 1994 in Yosemite Valley (Pierson and Rainey 1995, as cited in NPS 2000a). Suitable habitat occurs in the riparian corridors along the Merced River and Yosemite Creek and in woodlands within developed and undeveloped regions of the project area.

Long-legged Myotis Bat. The range of this federal species of concern includes most of western North America, as far north as Alaska and south to central Mexico. The species prefers forested mountainous areas and is sometimes found in desert lowlands. It is found up to high elevations in the Sierra Nevada, in montane coniferous forest habitats. The long-legged myotis bat forages over water, close to trees and cliffs, and in openings in forests; it roosts primarily in large-diameter snags. The species forms nursery colonies numbering hundreds of individuals, usually under bark or in hollow trees. The long-legged myotis bat was not recorded in recent surveys in the park

(Pierson and Rainey 1993 and 1995, as cited in NPS 2000a), but may occur since it was found in the Grinnell and Storer survey (1924, as cited in NPS 2000a). In addition, there have been several sightings throughout Yosemite Valley. Suitable habitat also occurs in the riparian corridors along the Merced River and Yosemite Creek and in woodlands within developed and undeveloped regions of the project area.

Yuma Myotis Bat. This federal species of concern is found across much of the western United States and into western Canada, usually below 8,000 feet in elevation. The species forages over open, still, or slow-moving water and above low vegetation in meadows. Yuma myotis bats roost in buildings, caves, or crevices; nursery colonies choose caves, mines, buildings, or under bridges. The species skims low over water to snatch up flying insects. Mist-net bat surveys were conducted in Yosemite Valley in 1993 at Mirror Lake, Cook's Meadow, El Capitan Meadow, and at Yosemite Creek below Yosemite Falls, and Yuma myotis bat was captured at Mirror Lake, El Capitan Meadow, and the Yosemite Creek site. This species was also found in recent mist-netting surveys in Yosemite Valley and Wawona (Pierson and Rainey 1993 and 1995, as cited in NPS 2000a), and there have been several sightings throughout Yosemite Valley. Suitable habitat also occurs in and adjacent to the Merced River and Yosemite Creek, in woodlands within developed and undeveloped areas, and in cliff face crevices north of Camp 4 and the Indian Cultural Center site.

Greater Western Mastiff Bat. The range of this federal species of concern includes southern California and Arizona, extending into Mexico. The species is found in a variety of habitats to over 8,000 feet in elevation. The species roosts primarily in crevices in cliff faces and occasionally in trees and buildings; it is detected most often over meadows and other open areas, but will also feed above forest canopy, sometimes to high altitudes (1,000 feet). There is a significant population of greater western mastiff bats in Yosemite Valley, as determined by mist-netting surveys (Pierson and Rainey 1995, as cited in NPS 2000a). Auditory bat surveys were conducted in 1993 at 24 stations in Yosemite Valley in four habitats: large open meadows, wetlands, forest, and open ponderosa pine forest. Acoustic surveys detected greater western mastiff bats in Bridalveil Meadow, El Capitan Meadow, Leidig Meadow, Cook's Meadow, Ahwahnee Meadow, Stoneman Meadow, Wosky Pond, and wetlands near Happy Isles. It was also detected in a few upland habitats east of El Capitan Meadow and Sentinel Beach Picnic Area. It was not detected at Mirror Lake. Yosemite Valley has the highest population of greater western mastiff bat of any locality surveyed in California; it also has been captured in Wawona (Pierson and Rainey 1995, as cited in NPS 2000a). Suitable habitat also occurs adjacent to Yosemite Creek and the Merced River, in woodlands within developed and undeveloped areas, and in cliff face crevices northwest of Camp 4 and the Indian Cultural Center site.

Golden Eagle. Golden eagles, a state species of special concern, occur over most of North America, ranging from high alpine habitats to low deserts. In the Sierra Nevada, golden eagles favor grasslands, areas of shrubs or saplings, and open-canopied woodlands of young blue oaks. Open terrain is needed for hunting (NPS 2000a). In most years, a nesting pair of golden eagles occupies a nest side on Elephant Rock in the Merced River gorge east of El Portal. Sightings also occur in Yosemite Valley, although these appear to be transient birds (NPS 2000a). This species may occur in the project area as a transient visitor.

Cooper's Hawk. Cooper's hawks, a state species of concern, inhabit discontinuous woodlands and riparian woodlands, especially deciduous woodlands. Dense stands of live oak, riparian deciduous, and other forest habitats near water are most frequently used by Cooper's hawks. Suitable habitat for Cooper's hawks is largely intact in Yosemite National Park, except for localized impacts from development, especially in Yosemite Valley. Nonetheless, Cooper's hawks are regularly seen in the Valley, often near developed areas (NPS 2000a). Suitable habitat for this species is located in the riparian corridors of the Merced River and Yosemite Creek, and in woodlands within developed and undeveloped regions of the project area.

Sharp-shinned Hawk. Sharp-shinned hawks, a state species of special concern, occur across most of North America, inhabiting woodlands and forests, hunting in openings and along edges. In California, they breed in a variety of forested habitats from 4,000 and 7,000 feet in elevation. They winter in all but the most barren and open habitats, and often descend to lower elevations. Nests of sharp-shinned hawks are typically located in dense stands of small conifers that are moist, cool, and well-shaded. The species is often present in areas near water with little ground cover (NPS 2000a). Suitable habitat for this species occurs within the riparian corridors of the Merced River and Yosemite Creek, and in woodlands within developed and undeveloped regions of the project area.

Willow Flycatcher. Willow flycatcher, a state endangered species, breeds in riparian and moist meadow willow thickets in the U.S. and southern Canada (AOU 1983, as cited in NPS 2000a). Nests are typically placed on the edges of vegetation clumps in a willow or other deciduous riparian shrub, usually near slow-moving streams. Willow flycatchers formerly nested in Yosemite Valley, but were last observed in 1966 (NPS 2000a). It is likely that human disturbance, habitat destruction, and brown-headed cowbird parasitism were factors in this disappearance. Suitable habitat for the willow flycatcher does not occur within the project area.

Yellow Warbler. Yellow warblers, a state species of special concern, breed over much of California, primarily in riparian woodlands up to 8,000 feet in the Sierra Nevada. Other breeding habitat includes montane chaparral, ponderosa pine, and mixed conifer where substantial amounts of brush occur (Zeiner et al. 1990, as cited in NPS 2000a). Localized destruction of riparian habitat from foot traffic, primarily in east Yosemite Valley, has likely affected yellow warblers. The majority of the Yosemite Lodge area does not support the brushy understory yellow warblers require for breeding. The Merced River riparian corridor may support this species.

Pallid Bat. Pallid bat, a state species of concern, is found throughout California, primarily in the low to mid-elevations, although it has been found to elevations over 10,000 feet in the Sierra Nevada. The species is found in a variety of habitats, from desert to coniferous forest and nonconiferous woodlands. It is particularly associated with ponderosa pine, redwood, and giant sequoia habitats. Pallid bats select a variety of day roosts, including rock outcrops, mines, caves, hollow trees, buildings, and bridges. Recent research suggests a high reliance on tree roosts. The species commonly uses bridges for night roosts. In 1994, mist-net bat surveys were conducted in Tuolumne Meadows, Pate Valley, and Wawona, and pallid bats were captured in Pate Valley and Wawona (Pierson and Rainey 1995, as cited in NPS 2000a). The species was also captured in Yosemite Valley in 1993 (Pierson and Rainey 1993 and 1995, as cited in NPS 2000a). Suitable habitat is located in the abandoned Yosemite Lodge cabins and in woodlands within developed and undeveloped regions of the project area.

Pale Big-eared Bat. This state species of special concern is found in all habitats up to the alpine zone. It requires caves, mines, or buildings for roosting and prefers mesic habitats, where it gleans from brush or trees along habitat edges. The species has been recorded at Wildcat Creek Bridge and Mirror Lake (CDFG 1999, as cited in NPS 2000a), and there have been several sightings throughout Yosemite Valley. Pale big-eared bat may occur in the project area.

Townsend's Big-eared Bat. In California, Townsend's big-eared bat, a state species of special concern, is found from low desert to mid-elevation montane habitats. The majority of records are from low to moderate elevations, though Townsend's big-eared bat has been found from sea level to almost 10,000 feet in elevation. Maternity colonies have been found up to over 5,000 feet in the Sierra Nevada. Townsend's big-eared bat is concentrated in areas with mines (particularly in the desert regions to the east and southeast of the Sierra Nevada) or caves (in the northeast portion of California and karstic regions in the Sierra Nevada and Trinity Alps) as roosting habitat (Pierson and Fellers 1998, as cited in NPS 2000a). This species also uses buildings and other structures as roosts. In 1994, mist-net bat surveys were conducted in Tuolumne Meadows, Pate Valley, and Wawona, and Townsend's big-eared bat was captured in Wawona (Pierson and Rainey 1995, as cited in NPS 2000a). It was also captured in Yosemite Valley in 1993 (Pierson and Rainey 1993 and 1995, as cited in NPS 2000a). Townsend's big-eared bat may occur in the project area.

Special-Status Plants

Of the 38 special-status plant species evaluated (Appendix D, Special-status Species Evaluation), suitable habitat for 8 special-status plant species occurs in the vicinity of the Yosemite Lodge Area Redevelopment. None of these species is listed as federally threatened or endangered. Four species are listed by Yosemite National Park as rare. One species is a Federal Species of Concern and three species are Federal Species of Local Concern. A brief overview of special-status plant species that are present or have potential to occur within the project area is provided below.

Rawson's Flaming Trumpet. This species was first identified in Sierra Nevada higher valleys. It is found in riparian zones between 3,500 and 6,300 feet in elevation (Federal Register 1996). Rawson's flaming trumpet has never been found within Yosemite National Park; however, suitable habitat is located within the Merced River riparian corridor.

Madera Linanthus. This species occurs within lower elevation woodlands and coniferous forests. Though this species has not been observed within Yosemite National Park, upland habitats within the project area provide suitable habitat.

Slender-stalked Monkeyflower. Slender-stalked monkeyflower inhabits moist granitic soils in mid-elevation chaparral habitats, woodlands, coniferous forests, meadow edges, and disturbed sites. This species has never been found within Yosemite National Park; however, suitable habitat is located within upland areas and restoration areas in the project site.

Yosemite Popcorn-flower. This herb is found in various forest habitats, meadows, and seeps. Although there are no reported occurrences within the immediate project area, upland and meadow habitats within the Merced River restoration area provide suitable habitat.

Sugar Stick. Sugar stick occurs within black oak woodlands and mixed coniferous forest areas. Past rare plant surveys have not identified this species in the project area; however, suitable habitat for this species occurs in black oak woodland and upland habitat within the project site.

Boreal Bedstraw. This species occurs in lower montane meadows. Past rare plant surveys have not identified this species in the project area; however, suitable habitat for this species occurs in meadow habitat within the Merced River restoration area.

False Pimpernel. False pimpernel is found in wet meadow habitats. Past rare plant surveys have not identified this species in the project area; however, suitable habitat for this species occurs in meadow habitat within the Merced River restoration area.

Ladies' Tresses. This perennial herb in the orchid family is found throughout western North America. It grows in wet meadows and bogs at elevations below about 8,200 feet. Past rare plant surveys have not identified this species in the project area; however, suitable habitat for this species occurs in meadow habitat within the Merced River restoration area.

Air Quality

Regional Setting

Yosemite National Park is classified as a mandatory Class I area under the federal Clean Air Act (42 United States Code 7401 et seq.). This air quality classification is aimed at protecting parks and wilderness areas from air quality degradation. The Clean Air Act gives federal land managers the responsibility for protecting air quality from adverse air pollution impacts, as well as preventing indirect air quality effects to other resources, such as plants, animals, soils, water quality, scenic views, cultural and historic structures and objects, and visitor health.

Yosemite Valley is located in Mariposa County, which is part of the Mountain Counties Air Basin. This air basin is regulated by the Mariposa County Air Pollution Control District. Mariposa County is currently in attainment or is unclassified for all national ambient air quality standards; however, Mariposa County exceeds two California ambient standards: ozone throughout the county and particulate matter less than 10 microns in diameter (PM-10) in Yosemite Valley.

Project Setting

Air Pollution Emission Sources

Air quality in Yosemite Valley, including air quality in the Yosemite Lodge area, is affected by emission sources both in and outside Yosemite National Park. Air pollution sources in the park include stationary sources such as furnaces, boilers, woodstoves, campfires, generators, barbecues, and prescribed fires. Motor vehicles are mobile sources, and emissions primarily include carbon monoxide, nitrogen oxides, and hydrocarbons (or volatile organic compounds). Estimates of criteria air pollutants from stationary, area, and mobile sources in the Valley for 1998 are summarized in table III-2. Visitation to the park continues to be approximately 3.5 million visitors per year. No major changes to facilities have taken place in Yosemite Valley since 1998, and thus these emission levels are expected to be similar for the year 2003. Most of the stationary and area sources are associated with park operations (National Park Service and concessioner). Campfires and associated emissions, however, are typically generated by visitors. Vehicles and tour buses constitute the largest sources of mobile-source emissions in Yosemite Valley (NPS 2000a).

Table III-2
1998 Estimated Air Emissions in Yosemite Valley

Source	Emissions (tons/year)					
	PM-2.5	PM-10	CO	SO_2	NO_2	VOC
Stationary Sources						
Fuel Oil Boilers/Furnaces	0.2	0.3	1.2	1.7	4.8	0.1
Liquid Propane Gas Heating/Cooking	0.1	0.1	0.3	0.0	1.8	0.1
Generators	0.3	0.3	1.1	0.3	4.9	0.3
Fireplaces	1.4	1.5	11.1	0.0	0.1	10.1
Fuel Storage Tanks/Refueling	0.0	0.0	0.0	0.0	0.0	1.6
Subtotal	**2.0**	**2.2**	**13.7**	**2.0**	**11.6**	**12.2**
Area Sources						
Campfires	6.0	6.5	53.2	0.0	0.0	7.2
Subtotal	**6.0**	**6.5**	**53.2**	**0.0**	**0.0**	**7.2**
Mobile Sources						
Visitor and Employee Vehicles, Buses, National Park Service, and Concessioner Vehicles	---	167.5	568.2	6.3	84.2	50.9
Total	**8.0**	**176.2**	**635.1**	**8.3**	**95.8**	**70.3**

PM-2.5/PM-10 = particulate matter measuring less than 2.5 microns and 10 microns, respectively; CO = carbon monoxide; SO_2 = sulfur dioxide; NO_2 = nitrogen dioxide; VOC = volatile organic compounds.

SOURCE: NPS 2000a

The air quality in Yosemite Valley is also affected by the transport of pollutant emissions from stationary sources outside Yosemite National Park. Operations at various power plants, food processors, and industrial facilities – some as far as 60 miles away – emit PM-10, sulfur dioxide, volatile organic compounds, carbon monoxide, and nitrogen dioxide that are transported to Yosemite Valley (NPS 2000a).

Sensitive Receptors

Land uses such as residences, schools, and hospitals are considered to be more sensitive than the general public to poor air quality because the population groups associated with these land uses have an increased susceptibility to respiratory distress. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences. Visitors to Yosemite Lodge and Camp 4 are not exposed to the ambient air quality at these locations over the long term, and thus are generally not considered true sensitive receptors. While Yosemite Valley draws both adolescent and elderly visitors, population groups that are sensitive to air quality, exposure to the ambient air quality in Yosemite Valley is temporary; thus, these groups are not considered sensitive receptors to local air emissions.

Noise

Environmental noise usually is measured in A-weighted decibels (dBA).[2] Environmental noise typically fluctuates over time, and different types of noise descriptors are used to account for this variability. Typical noise descriptors include the energy-equivalent noise level (Leq) and the day-night average noise level (Ldn).[3] Generally, a 3-dBA increase in the ambient noise level represents the threshold at which most people can detect a change in the noise environment; an increase of 10 dBA is perceived as a doubling of loudness. Ambient (background) noise levels in Yosemite Valley typically range from 60 to 65 dBA Ldn (NPS 2001b). As a point of reference, a conversation between two people would typically measure about 60 dBA. A noise level above 80 dBA can cause hearing loss if prolonged.

Regional Setting

Natural sources of noise in Yosemite Valley include waterfalls, rushing water, wind, and wildlife. There is also noise from human activities and mechanical devices such as automobiles, trucks, and transit buses. Visitors to Yosemite Valley would be the predominant sensitive receptors in the region.

Project Setting

Existing noise within the Yosemite Lodge area results from motor vehicles, buses, delivery trucks, mechanical devices associated with building operations, operation of landscaping equipment, aircraft flying overhead, and from human activities such as talking and yelling. Ambient noise levels in the vicinity of the project site are primarily influenced by vehicle travel on Northside Drive and in the parking lots. Trucks delivering supplies to the food and housekeeping facilities also add noise to the environment. Natural sounds in the Yosemite Lodge area, such as wind rustling trees, flowing water, birds, and animals, are not considered to be noise but do contribute to the overall noise environment.

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, hotels, campgrounds, schools, hospitals, and outdoor recreation areas are generally more sensitive to noise than commercial and industrial land uses. Yosemite Lodge and Camp 4 are considered sensitive receptors because they serves as a retreat with overnight lodging and recreation facilities. In such areas, excessive noise (in duration or intensity) detracts from the visitor experience. Campgrounds, trails, and recreation areas located along roadways that provide access to and from the Yosemite Lodge Area Redevelopment site (i.e., Big Oak Flat Road, El Portal Road, Wawona Road, Northside Drive, Southside Drive) are also sensitive to noise.

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[2] A decibel (dB) is a unit of sound energy intensity. Sound waves, traveling outward from a source, exert a sound pressure level (commonly called "sound level") measured in dB. An A-weighted decibel (dBA) is a decibel corrected for the variation in frequency response of the typical human ear at commonly encountered noise levels.

[3] Leq, the energy-equivalent noise level (or "average" noise level), is the equivalent steady-state continuous noise level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level that actually occurs during the same period. Ldn, the day-night average noise level, is a weighted 24-hour noise level. With the Ldn descriptor, noise levels between 10:00 p.m. and 7:00 a.m. are adjusted upward by 10 dBA to take into account the greater annoyance of nighttime noise as compared to daytime noise.

The predominant sensitive receptors would be visitors to the Yosemite Lodge area. Trail and recreational users in the Lower Yosemite Fall area are the sensitive receptors closest to the project area.

Sound-level measurements were obtained on a weekday in September 2002 at eight locations in the Yosemite Lodge Area Redevelopment project area. Each measurement was taken for a 10-minute period during the afternoon with a Metrosonics dosimeter (Model 308-b). The dosimeter was calibrated with a Metrosonics sound-level calibrator. Table III-3 displays the average sound level, maximum sound level, and location of each measurement.

Table III-3
Sound-Level Measurements near Yosemite Lodge

#	Location	Distance from Nearest Road (centerline)	Time	Description of Sound / Noise Sources	Leq[1]	Lmax[2]
1	Intermittent drainage west of Camp 4	300 feet from Northside Drive	15:43	Traffic noise predominated. Also, birds and wind rustling leaves. Sometimes voices.	50.4	59.5
2	Southern boundary of Camp 4, near bathroom	147 feet from Northside Drive	16:04	Voices, bear boxes, occasional traffic, footsteps, car doors.	49.0	56.7
3	60 feet north of Elderberry building	50 feet from Northside Drive	16:31	Traffic noise predominated. Also, occasional birds and voices.	61.5	77.9
4	Southeast of intersection of Northside Drive and entrance to Yosemite Lodge parking lot	45 feet from center of intersection	17:08	Traffic noise predominated. Also, occasional voices.	61.8	74.9
5	150 feet south of Dogwood building	300 feet from Northside Drive	17:31	Traffic noise, car doors from parking lot, birds, delivery truck doors.	47.3	56.2
6	Along western trail to Lower Yosemite Fall	150 feet from parking lot	17:57	Voices, traffic in distance, footsteps, birds.	43.4	64.3
7	Swinging Bridge (during low flow)	250 feet from Southside Drive	18:25	Voices, traffic, birds, footsteps, ducks.	47.0	57.7
8	Sentinel Bridge	15 feet from centerline and 50 from Southside Drive	18:47	Traffic (cars and buses), voices, cameras.	62.3	79.8

1 Leq = logarithmic average of the sound during a 10-minute duration
2 Lmax = maximum sound level recorded during a noise event

SOURCE: Environmental Science Associates

Cultural Resources

Archeological Resources

Regional Setting

Yosemite Valley is designated an archeological district and is listed on the National Register of Historic Places. The entire Valley has been surveyed for archeological resources, except for wet meadows, areas of dense vegetation, and some talus slopes. The archeological district in the Valley comprises more than 100 known sites, many of which are significant for their ability to yield important information about prehistoric lifeways. The prehistoric sites include milling stations (granite boulders with mortar cups or milling slicks, the most common feature documented to date); artifact caches and scatters (including obsidian waste flakes, obsidian and ground stone tools, soapstone vessel fragments, and dietary faunal remains); midden soils; rock shelters; pictograph panels; human burials; house floors; fire hearths; and rock alignments. Historic archeological sites include trash deposits, building foundations, privy pits, utilities, human burials, and landscape features such as ditches, roads, rock alignments, non-native plants, and trails (NPS 2000a).

Individual sites in the archeological district vary by type, size, depth, complexity, length of occupation, variety of remains, and potential to yield important scientific information. A parkwide archeological research design (Hull and Moratto 1999) provides guidance in assessing the research potential of these sites. Important questions are identified in the areas of paleoenvironment, cultural chronology, economic patterns, settlement patterns, demography, and social organization. While the majority of archeological sites in Yosemite Valley retain a relatively high degree of integrity, many have been disturbed by human activity and natural processes (Hull et al. 1995). Visitor use has the most widespread impact, although its effect is not as serious as other types of impacts. Several sites have been damaged by the construction of facilities and utilities. A significant number have been affected by ongoing natural processes such as tree falls, river migration, alluviation, and rockfalls. Due to past geologic activity in Yosemite Valley, there is the potential for buried archeological resources, especially in areas of alluvial deposits and rockfalls (NPS 2000a).

Project Setting

Five designated archeological sites lie within the Yosemite Lodge Area Redevelopment site. These include a U.S. Army camp and sites associated with the American Indian habitation of Yosemite Valley, including historically documented Indian villages. Each of these five recorded sites is described below.

Site CA-MRP-59/H

Site CA-MRP-59/H contains a prehistoric and historic component. The prehistoric component of the site consists of four stationary milling features (large stones or bedrock used for the processing or milling of foods), with a total of 17 mortar cups and 4 milling slicks (smooth parts of a stone where grains were milled) and an associated obsidian lithic scatter. Ground stone fragments, including a handstone and steatite vessel fragment, and sparse faunal remains have also been recorded. Few artifacts are apparent on the surface of the site; most were identified in subsurface exposures during test excavations (Hull et al. 1995). Recent monitoring of soil testing confirmed these findings (NPS 1999d). The historic component includes a sparse scatter of glass,

metal, ceramic, brick, and stone fragments. Archeological deposits contain information regarding prehistoric technological changes and development, cultural chronology, and economic trade patterns.

Documentation suggests that CA-MRP-59/H (as well as site CA-MRP-240-303/H) may represent a portion of the village of *Koom-i-ne* (Bibby 1994; Merriam 1917). Archival research indicates that primary historic use of the area relates to the U.S. Army camp, located in the northern portion of the site area, which contained canvas tents, wood-framed structures, and associated trash.

Site CA-MRP-63

CA-MRP-63 consists of two stationary milling stations with 19 cups and 2 milling slicks. Subsurface testing identified a deposit of obsidian debitage and tools, steatite disk beads, hammer stones, and fragmentary faunal remains (Hull et al. 1998). Diagnostic artifacts include Desert Side-notched and Rose Spring series projectile points. The distribution of artifacts suggests that a large boulder located on the site may have been used as a shelter. Excavations at the site have shown evidence of prehistoric technological change, cultural chronology, and economic trade patterns. In addition, the site contains historic and/or modern debris consisting of coins, glass, metal, and ceramic fragments. The site shows evidence of recent campfires, trampling, and subsurface disturbance.

Site CA-MRP-240/303/H

Seven stationary milling features with a total of 63 mortar cups and 5 milling slicks have been recorded at site CA-MRP-240/303/H. Other archeological constituents are sparsely scattered faunal remains and obsidian tools and debris (Hull et al. 1995). Diagnostic artifacts include Eastgate, Elko, and Sierra series projectile points, and a steatite bowl reconstructed from fragments.

A 1994 study of American Indian traditional resources indicates that CA-MRP-240/303/H represents at least a portion of the former American Indian village of *Koom-i-ne* (Bibby 1994). Furthermore, this site has been the location of historic Euro-American activities, in particular the establishment of Camp Yosemite by the U.S. Cavalry in 1906. Early topographic maps indicate the location of six buildings along the old road to the main bridge; these dwellings were apparently known as “Soapsuds Row.” This group of buildings was likely a laundry unit operated by women. This site has been determined eligible for listing on the National Register of Historic Places and is a contributing element of the Yosemite Valley Archeological District (Hull et al. 1995). The site contains information relating to prehistoric cultural chronology, subsistence, economic trade patterns, changes in settlement patterns, and site use over time in Yosemite Valley.

Site CA-MRP-305/H

Site CA-MRP-305/H is also known as Indian Village, New Village, or *Wa-ho-gah*. The site includes 10 stationary milling features with a total of 58 cups and 22 slicks, and 2 rockshelter features. Archeological testing and monitoring projects (NPS 1994a; Hull et al. 1995; Mundy 1985, 1986) identified a variety of associated artifacts, including a light but widespread obsidian lithic scatter, a small can and historic debris scatter, and foundations and graded areas associated with 17 buildings constructed in 1931 and removed in 1968 (NPS 1994a). Temporally diagnostic artifacts include Rose Spring, Desert Side-notched, and Elko series projectile points (Mundy 1986).

Historic documentation suggests that the site is part of *Wah-ho-gah*, reported to be the last occupied Indian village in Yosemite Valley (Bibby 1994; Merriam 1917). However, the site was occupied prehistorically as well, and not all cultural deposits relate to the historic-period use of the site. Because of this long history of use, including habitation by living individuals, the site is considered highly significant. This site has been determined eligible for listing on the National Register of Historic Places and is a contributing element of the Yosemite Valley Archeological District (Hull et al. 1995).

Site CA-MRP-748/765/H

Site CA-MRP-748/765/H consists of a light scatter of obsidian artifacts, steatite beads, ground stone implements, and faunal remains, all of which were identified during utility trenching or archeological subsurface testing (NPS 1999d; NPS 1990; Hull et al. 1995). Diagnostic artifacts include one Desert Side-notched point. Historic debris includes bottle glass fragments, wire nails, ceramic and metal fragments, and other debris. This site represents a portion of the American Indian historic village of *Wah-ho-gah*, Merriam's site number 7 (Merriam 1917), also represented by CA-MRP-305/H. This site has been determined eligible for listing on the National Register of Historic Places and is a contributing element of the Yosemite Valley Archeological District (Hull et al. 1995). The site contains information that addresses economic trade patterns as well as prehistoric settlement and use of Yosemite Valley through time.

Archeological test excavations and sampling of four of the archeological resources within the project were conducted at CA-MRP-59/H, CA-MRP-63, CA-MRP-240/303/H, and CA-MRP-748/765/H (Hull and Moratto 1999). This work supplemented previous studies at these sites. CA-MRP-305/H was tested by Hull et al. (Hull et al. 1995). Table III-4 presents a summary of the results, recommended National Register of Historic Places status, and recommendations regarding further work in relation to the Yosemite Lodge Area Redevelopment, based on Hull et al. (1995) and Hull et al. (1999).

Table III-4
Archeological Test Excavation Results

Site	National Register of Historic Places Status	Recommendations
CA-MRP-59/H	Eligible	Avoidance or data recovery in western site area; archeological monitoring of construction in site areas
CA-MRP-63	Eligible	Avoidance or data recovery; archeological monitoring of construction
CA-MRP-240/303/H	Eligible	Archeological monitoring of construction, with an Inadvertent Discovery Plan for that portion of the site within the area of potential effect
CA-MRP-305/H	Eligible	None, as excavation was not project specific (Hull et al. 1995); application of 1999 Programmatic Agreement treatments to resolve adverse effects (data recovery, monitoring)
CA-MRP-748/765/H	MRP-765 found eligible MRP-748 found ineligible during re-evaluation	Avoidance or data recovery in western site area; archeological monitoring of construction in all site areas No further treatment

Traditional American Indian Resources

Regional Setting

Traditional resources consist of features of the landscape that are linked by members of a contemporary community to their traditional ways of life. As more specifically defined in the NPS *Management Policies 2001* (NPS 2000c), traditional resources are "objects and places, including sites, structures, landscapes, natural resources, and spiritual places, with traditional cultural meaning and value to associated people." A traditional cultural property is a traditional resource or group of resources that are eligible for listing on the National Register of Historic Places (NPS 2000a).

An Ethnographic Evaluation of Yosemite Valley: The American Indian Cultural Landscape (Bibby 1994) identified and documented cultural and natural resources associated with American Indian occupation and use of Yosemite Valley. American Indians currently living in the region provided oral history and assisted in the location of resources. The evaluation recommended that Yosemite Valley be designated a traditional cultural property and listed on the National Register of Historic Places as a district (NPS 2000a).

In addition, the National Park Service has consulted with American Indian groups claiming association with land and resources in Yosemite Valley and El Portal, primarily the Southern Sierra Miwuk (American Indian Council of Mariposa County) and the Mono Lake Paiute (Mono Lake Indian Community). Chukchansi Yokuts, Western Mono, and Central Sierra Miwuk individuals have some family ties to the park (NPS 2000a).

Although not yet formally listed on the National Register, the National Park Service is in the process of compiling information for a proposed Yosemite Valley Ethnographic Landscape Traditional Cultural Property. Over the years, through existing agreements and ongoing consultation with culturally associated American Indian tribes, tribal groups have accessed and used special resources in Yosemite Valley. Consistent with the *Yosemite Valley Plan*, National Park Service and culturally associated American Indian groups are continuing to develop a parkwide gathering plan. The proposed Yosemite Valley Ethnographic Landscape Traditional Cultural Property coveys an understanding of indigenous American Indian settlement, management, and cultural continuity.

Project Setting

Based upon research completed by the National Park Service (Bibby 1994), five historic resources are located within the project area. Within the project area, these resources include the American Indian village of *Koom-i-ne*, an area used for the gathering of *helli* (large white mushrooms, possibly *Lentinus lepideus*), several groves of California black oaks, and a location where bracken fern was and continues to be procured. The traditional village of *Wah-ho-gah* is located at the Indian Cultural Center site. These five resources are contributing elements of the proposed Yosemite Valley Ethnographic Landscape Traditional Cultural Property District.

Lower Yosemite Fall Area

Koom-i-ne. Among the several historic villages within the Valley was *Koom-i-ne*, which was located at least partially within the project area (Bibby 1994). According to one report, this village was the most important in the Valley (Merriam 1917). *Koom-i-ne* is at least partially represented in the archeological record by site CA-MRP-240/303/H and possibly site CA-MRP-59/H. The village is considered eligible for listing on the National Register of Historic Places as a contributing element to the Valleywide Traditional Cultural Property District.

Helli. Through consultation with culturally associated Native American tribes, an area was identified within the project vicinity, adjacent to the existing Yosemite Creek Bridge, where *helli* mushrooms are gathered (Bibby 1994). This particular mushroom "has continued to be one of the most important, regularly gathered resources in Yosemite Valley" (Bibby 1994). *Helli* first appears in May and is evidently present for harvest through the summer. This gathering area is considered eligible for listing on the National Register of Historic Places as a contributing element to the Valleywide Traditional Cultural Property District.

California Black Oaks. California black oak acorns were the most important plant food to American Indians in California, including the Southern Sierra Miwuk. The National Park Service identified a grove of California black oaks within the project area, adjacent to Yosemite Creek, that has been used as a traditional gathering area. Other traditional gathering areas include a grove of oak trees southeast of Camp 4, near Northside Drive (Bibby 1994). The traditional gathering areas are considered eligible for listing on the National Register of Historic Places as a contributing element to the Valleywide Traditional Cultural Property District.

Bracken Fern. Bracken fern, an important component of traditional basket making to the Southern Sierra Miwuk and Mono Lake Paiute, is prevalent throughout Yosemite Valley. Not all bracken fern, however, exhibits the required physical characteristics needed for basket weaving (e.g., length, straightness, and ease of extraction). A number of local weavers identified the eastern channel of Yosemite Creek as one location where the bracken fern was traditionally gathered for use in basket making (Bibby 1994). This gathering area is considered eligible for listing on the National Register of Historic Places as a contributing element to the Valleywide Traditional Cultural Property District.

Indian Cultural Center

Wah-ho-gah. *Wah-ho-gah* was the last occupied Indian village in Yosemite Valley and is one of the few habitation sites in the Valley that can be linked to living people. Indians moved to the site in 1932, when new housing was established east of Camp 4. Although this most recent phase of use dates from the 1930s through the 1960s, archeological evidence of habitation (CA-MRP-63 and CA-MRP-305/H) long predates this latest occupation. Many of the milling stations already existed, although beginning in 1932 many were used again, and new mortar cups may have been created. These milling features have continued to be used sporadically through at least the 1990s. In addition, American Indian informants recall individual cups they used for pounding acorns, as well as the locations of hearth rings, houses, acorn processing areas, and other features (Bibby 1994). This village is considered eligible for listing on the National Register of Historic Places as a contributing element to the Valleywide Traditional Cultural Property District.

Cultural Landscape Resources, including Historic Sites and Structures

Regional Setting

A nomination for listing the Yosemite Valley cultural landscape as a historic district in the National Register of Historic Places is being formalized. According to the NPS-28 *Cultural Resources Management Guidelines*, a cultural landscape is a reflection of human adaptation and use of natural resources. It is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions (NPS 2000a).

Thus, cultural landscapes are the result of the long interaction between humans and the land, and the influence of beliefs and actions over time upon the natural landscape. Shaped through time by historical land use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past, a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes. They are a good source of information about specific times and places, but their long-term preservation is a challenge (NPS 2000a).

Although not yet formally listed on the National Register, Yosemite Valley is a significant cultural landscape that conveys an understanding of historic exploration and settlement, architecture, recreation, art, landscape architecture, and conservation. The boundaries of the Yosemite Valley cultural landscape extend from Valley rim to rim and from Pohono Bridge to Mirror Lake and Happy Isles, including the Valley walls themselves and several historic trails. Historic view corridors also contribute to the significance of the Yosemite Valley cultural landscape (NPS 2000a).

Project Setting

The Yosemite Lodge Area Redevelopment site includes two trails and one campground that contribute to the significance of the Yosemite Valley cultural landscape. These features are associated with recreational development and the tourist industry in the Valley. Although the project area lies within the larger Yosemite Valley Cultural Landscape Historic District, it does not contain individually significant buildings or structures that are contributing elements to the historic district. The specific cultural resources existing in the project area are briefly described below.

Yosemite Falls Trail (YOSE-0-55747)

This trail is eligible for listing on the National Register of Historic Places (NPS 2001e). It was built between 1873 and 1888 and is approximately three-and-one-half miles long. The trailhead leaves the Valley floor west of Yosemite Village near the base of the Lower Brother and follows Yosemite Creek on its west side to the top of Upper Yosemite Fall. The Yosemite Falls trailhead is located at its junction with the Valley Loop Trail, near Camp 4 (Land and Community Associates 1994; NPS 2001e).

Valley Loop Trail (P-22-272, YOSE-0-59729)

This cultural resource is a 20.75-mile trail that traverses the Valley floor and includes excursions into the lower talus slopes of the Valley and to Mirror Lake. The trail is also known as the Bridle Path, and a section of the trail is known as the Mirror Lake Loop Trail. This resource is the old bridle trail system that followed earlier American Indian paths in the Valley and still serves equestrian riders from the Yosemite Valley stable near Curry Village (Land and Community Associates 1994; NPS 2001e). Portions of the trail were established in 1892, 1916, and 1928, and the entire Valley Loop Trail was formally developed in the 1930s. The trail averages from 4 to 6 feet wide and includes 89 features that include water bars, culverts, bridges, retaining walls, and cobble-paved sections (Fox and Shaw 1998).

The Valley Loop Trail is associated with early visitation and tourism in the Yosemite Valley, and its location has not changed significantly since it was formally developed. The trail retains sufficient integrity to be considered eligible for the National Register of Historic Places, presumably under Criteria A and C (Fox and Shaw 1998). The most current Listing of Classified Structures states that the Valley Loop Trail is eligible for listing on the National Register of Historic Places and should be preserved and maintained (NPS 2001e).

Camp 4

Camp 4 walk-in campground has been listed on the National Register of Historic Places for its association with the growth and development of rock climbing as a recreational activity in Yosemite Valley (NPS 2001d,e). Camp 4 is significant because it was a meeting ground and important focal point for climbers in Yosemite Valley from 1947 to 1970. It served as a place of training, ascent planning, information and equipment exchange, and camaraderie with other climbers. The approximately 10-acre site includes the open, boulder-strewn areas (adjacent to the Valley Loop Trail at the base of the talus slope) used as campsites by many early climbers; the parking area (important for equipment/expedition staging and preparation); and the more concentrated campground area containing the original restrooms, the search and rescue camp, and other camp infrastructure elements (NPS 2001d,e).

Social Resources

Scenic Resources

Regional Setting

The scenery of Yosemite National Park is one of its most significant features. From the first descriptions of Yosemite Valley by Euro-Americans in the mid-19th century, views of the pastoral valley juxtaposed with towering geologic features and dramatic waterfalls have been recognized as outstanding. Many of these views have become cultural icons of the American landscape experience, made timeless through the legacy of landscape documentation in Yosemite Valley. It is largely through the early writings, paintings, and photographs of visitors to the region, as well as those of nationally recognized artists, that the beauty of the landscape came to the attention of the nation, influencing legislation that led to the designation of Yosemite National Park (NPS 2000a).

Prior to the development of the *General Management Plan* (NPS 1980), a study was conducted to analyze historic viewpoints – those features most visitors look for and can distinguish – and to identify existing viewing conditions within Yosemite Valley. First, the historic viewpoint analysis

located places within Yosemite Valley that were consistently selected by eminent historic photographers as the best locations from which to photograph scenic features. Next, a list of significant scenic features was developed. According to this study, the 11 most significant features within the Valley are Half Dome, Yosemite Falls, El Capitan, Bridalveil Fall, Three Brothers, Cathedral Rocks and Spires, Sentinel Rock, Glacier Point, North Dome, Washington Column, and Royal Arches. All points from which these 11 features were typically viewed (assuming that no vegetation or structures obstructed the view) were mapped to establish the scenic viewing possibilities from different locations on the Valley floor. Once the historic and existing viewpoints were established, views from these locations in the Valley were classified according to the criteria shown in table III-5, and Yosemite Valley was mapped applying the three scenic categories. Historic view corridors also contribute to the significance of the Yosemite Valley cultural landscape (NPS 2000a).

Table III-5
Classification Criteria for Scenic Category

Category	Criteria
A–Scenic	■ Most commonly chosen by eminent early photographers and painters ■ Currently considered most significant scenic views ■ Includes all meadows and the Merced River
B–Scenic	■ Less commonly chosen by historic photographers and painters ■ Compose less significant modern views
C–Scenic	■ Currently considered of minor scenic quality ■ Areas that can accept visual intrusion without detracting from primary or secondary views

SOURCE: NPS 2000a

Inherent in the beauty of the 11 most significant features and other scenic resources are the foreground and mid-ground elements of the landscape. Particularly the Merced River and its ecosystem – a mosaic of aquatic, riverside, and meadow communities – and other characteristic features of Yosemite Valley's landscape, such as California black oak woodlands and its premier cultural features, contribute to the Valley's unique scenery (NPS 2000a).

Development in Yosemite Valley can be a visual intrusion as seen from popular Yosemite Valley vantage points (i.e., locations that are either designed for or provide specific opportunities for visitors to view the scenery). As identified in the *Final Yosemite Valley Plan/Supplemental Environmental Impact Statement*, Yosemite Lodge would continue to be a visual intrusion from important Yosemite Valley vantage points, including Columbia Point and Upper Yosemite Fall.

Nearly 100 years of fire suppression has resulted in a visual change from open forests to dense thickets of tree species in many areas of Yosemite Valley, including at the project area. Broadleaf trees along the riverbanks have been replaced by the comparatively dense stands of conifers that exist today. Conifers now block views of important scenic features that were visible before the vegetation patterns were changed.

Project Setting

Based on the Yosemite Valley Scenic Analysis map (NPS 2000a), Yosemite Lodge is classified as A-Scenic, and the majority of Camp 4 is classified as B-Scenic, although a small area on the eastern end of Camp 4 is classified as A-Scenic. The area west of Camp 4 where the Indian Cultural Center is proposed to be located is classified as B-Scenic. The Lodge site provides several historic viewpoints of Yosemite Falls (NPS 1980).

Yosemite Lodge is a large and visually diverse site. The eastern portion of the site is characterized by developed open areas and sparse vegetation. Short-range views of the Lodge site include rectilinear buildings in shades of dark brown interspersed with mixed conifer and deciduous trees and low-lying shrubs. The buildings and sparsely forested areas are interspersed with parking areas, roadways, and hardened pedestrian pathways. Visually, Yosemite Lodge is among the most densely developed areas in Yosemite Valley. Existing lodging unit buildings appear dated and somewhat rundown, and temporary modular units (e.g., employee housing and the Wellness Center) would continue to detract from the visual setting of the Lodge.

The western portion of the site features mixed woodlands and shrubs with hardened dirt surfaces, and developed features are much less visually prominent than in the eastern area of the Lodge site. The Merced River and Yosemite Creek form the southern and eastern boundaries of the Yosemite Lodge site, respectively. The water elements, mixed sandy and rocky banks and shoals, and riparian vegetation add considerable visual texture and variety to these areas of the site.

Medium-range views from the Yosemite Lodge site include views of tents, tent cabins, and wooded areas at Camp 4; the Northside Drive roadway corridor and vehicular traffic; the former parking area at Lower Yosemite Fall; and adjacent open woodlands and meadows. Long-range views from the Yosemite Lodge site include prominent views of Yosemite Falls and Sentinel Rock from the entry roadway to the Lodge site (see figure III-2). Other long-range views from Yosemite Lodge include views from other vantage points of Yosemite Falls to the north, Sentinel Rock and Cathedral Rocks and Spires to the south, and Half Dome and North Dome to the east. The architecture of Yosemite Lodge buildings, such as the Mountain Room Restaurant and Mountain Room Bar, were designed to provide long-range views of Yosemite Falls and other spectacular geologic features in Yosemite Valley. Over time, however, views from these vantage points have been blocked by the growth of landscape vegetation, such as incense-cedars.

Short-range views of Camp 4 are characterized by open woodlands, large boulders, and bare ground with leaf litter. Human-built features are prominent on the short-range visual landscape, including a mosaic of domed, multicolored visitor tents; the rectilinear, yellow restroom building; boxy search and rescue tent cabins and campground kiosk; and the electrical substation. East of the dirt parking lot, Camp 4 is undeveloped and the landscape is characterized by a mixed conifer forest, low-lying shrubs and grasses, and fallen woody debris. Medium-range views from the site include views of Yosemite Lodge parking areas and developed features, the Northside Drive roadway and intermittent traffic, and adjacent wooded areas. Long-range views from Camp 4 include views of Yosemite Falls to the east (see figure III-2), Sentinel Rock to the south, and North Dome and Half Dome to the east.

Immediately west of Camp 4 where the Indian Cultural Center is proposed, short-range views of the site are characterized by open woodlands. There are no visible developed features at the site. The area provides medium-range views of the search and rescue tents at Camp 4, intermittent

traffic along Northside Drive, and wooded areas adjacent to the site. The site provides long-range views of Cathedral Rocks and Spires and the high peaks and sheer cliff walls of Yosemite Valley.

Visitor Experience

Regional Setting

Visitor experiences in Yosemite Valley are highly individualized. Some come simply to see Yosemite's icons—its waterfalls and geologic features. Others visit to experience a place they have found unique, for personal challenges, timelessness, a place and pace different from their day-to-day experiences, or a personal connection with the grandeur or intricacies of Yosemite Valley. The Valley provides a transition zone—a place neither urban nor wilderness, but with elements of both. The continuum of visitor experiences extends from highly social to isolated, from independent to directed, from spontaneous to controlled, from easy to challenging, and from natural to more urban (NPS 2000a).

Because of its limited facilities and access, many of the Valley's more natural experiences are found in the west Valley. Except for roads and turnouts, visitor facilities in most of the west Valley are sparse compared to the east Valley. The east Valley is the location of all Yosemite Valley visitor accommodations, campgrounds, and major facilities and services provided by the National Park Service and concessioners. A hiking and stock trail loops around the Valley perimeter, but bicyclists have access to the west Valley only by sharing roads with motor vehicles. Quiet and solitude, an important characteristic of a quality visit for many visitors, is sometimes difficult to find, as roads carry traffic on both sides of the Merced River for nearly the entire length of the Valley. As the number of park visitors and cars decreases in the off-season, it becomes easier to find quiet and solitude in the Valley (NPS 2000a).

Recreation opportunities in the Valley include sightseeing, hiking, bicycling, climbing, stock use, picnicking, winter activities, rafting, swimming, fishing, and tours. The Valley includes several visitor services, including but not limited to: overnight lodging at Housekeeping Camp, Curry Village, Yosemite Lodge, and The Ahwahnee; camping at six campgrounds with a total of 475 campsites; food service; and a medical and dental clinic. The Valley also includes several orientation and interpretation opportunities, such as at the park's principal visitor center located in Yosemite Village, the Yosemite Museum, the LeConte Memorial Lodge, and the Nature Center at Happy Isles. The Valley visitor experience is further described in the *Yosemite Valley Plan*.

The Yosemite Museum is located next to the Visitor Center and offers exhibits on the cultural history of Yosemite as well as changing exhibits that deal with art history and park history in the museum gallery.

Project Setting

Recreation

The Yosemite Lodge Area Redevelopment site provides a range of recreation opportunities, including camping, sightseeing, hiking, bicycling, climbing, picnicking, and other activities. These recreational opportunities are described below.

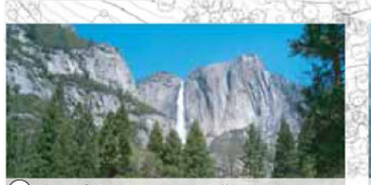
Figure III-2
Key Views


15 View of Talus Wall


14 View of Talus Wall


16 View toward Upper Yosemite Fall


17 View toward Half Dome


13 View of Upper Yosemite Fall


12 View of Sentinel Rock

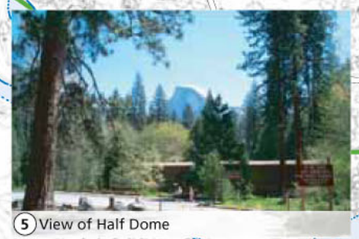

11 View toward Leidig Meadow

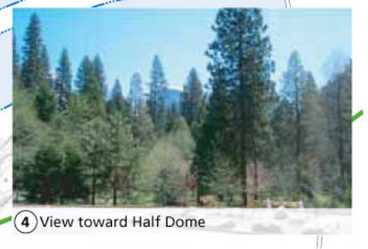

10 View of Cathedral Rocks and Spires


1 View of Upper and Lower Yosemite Fall


2 View of Upper Yosemite Fall


3 View of Sentinel Rock


5 View of Half Dome


4 View toward Half Dome


18 View toward Yosemite Lodge Area from Yosemite Chapel


9 View of Upper Yosemite Fall


8 View of Sentinel Rock


7 View of Upper Yosemite Fall


6 View of Sentinel Rock

VALLEY LOOP TRAIL
CAMP 4
NORTHSIDE DRIVE
MERCED RIVER
YOSEMITE CREEK
LOWER YOSEMITE FALL PROJECT
YOSEMITE LODGE
BIRCH
AZALEA
COTTONWOOD
ELDERBERRY
MANZANITA
WILLOW
BAR/RETAIL BUILDING
FOOD & BEVERAGE BUILDING
CEDAR
DOGWOOD
ASPEN
TAMARACK
LAUREL
JUNIPER
MAPLE
ALDER
HEMLOCK

LEGEND
- River Protection Overlay
- Existing Buildings
- Existing Lodge Guest Units
- Significant View

1 ACRE
0 75ft 150ft 300 ft

SOURCE: National Park Service

Camping. Public camping in the project area is provided at Camp 4, a walk-in campground with 37 campsites (see figure II-1). All sites operate on a first-come, first-served basis. There are no disabled-accessible campsites. Each campsite includes a fire ring, picnic table, and three food storage lockers and allows up to six individuals. Recreational vehicles and pets are not allowed at Camp 4. Camp 4 includes a restroom building and an information kiosk. A 111-space, unpaved parking lot is located to the east of the campground on the site of the former gas station. Given the campground's location adjacent to the north Valley wall, use of Camp 4 is often dominated by climbers. Camp 4 provides access to adjacent trails such as the Valley Loop and Yosemite Falls Trails, as well as other nearby Valley visitor experience opportunities. Camp 4 is further described under Chapter II, Alternatives.

Sightseeing. According to a study of visitors exiting the park, about 90% of visitor groups reported sightseeing as an activity their parties participated in while in the park (Gramman 1992, as cited in NPS 2000a). Sixty percent of visitor parties took photographs, and more than half reported nature study as an element of their trip. Sitting or standing quietly, absorbed in thought or in awe of one of Yosemite's majestic views, was found to be basic to the park experience. Artistic pursuits and wildlife viewing were also important to the enjoyment of the park. Sightseeing opportunities in the Yosemite Lodge Area Redevelopment area include views of Yosemite Falls, meadows, domes, and distant peaks.

Hiking and Bicycling. Forty-four percent of summer visitors arriving in their own cars and 32% of bus passengers reported day hiking while in the park. A greater proportion of park visitors hike during other seasons. Paved trails are approved for use by visitors with pets; however, fewer than 2% of visitors traveling in their own vehicles travel with pets (NPS 2000a).

A multi-use paved (bicycle and pedestrian) trail, known as the Valley Loop Trail, links Yosemite Lodge to the Happy Isles area on both sides of the Merced River (see figure II-1). This 20.75-mile trail traverses the Valley floor and includes excursions into the lower talus slopes of the Valley and to Mirror Lake. The trail is also known as the Bridle Path, and a section of the trail is known as the Mirror Lake Loop Trail. The trail averages from 4 to 6 feet wide. In addition, the three-and-one-half-mile-long Yosemite Falls Trail is accessible from the project area. The trailhead leaves the Valley floor west of Yosemite Village near the base of the Lower Brother and follows Yosemite Creek on its west side to the top of Upper Yosemite Fall. Views of both the upper and lower falls are visible from the trailhead. The Yosemite Falls trailhead is located at its junction with the Valley Loop Trail, near Camp 4. Visitors walk and bicycle within the Lodge grounds and Camp 4 on multi-use paved trails; a stock trail is available at the western end of the site, but does not connect with other area trails (see figure II-4). Bicycles are allowed on paved trails and roads only.

Climbing. Yosemite Valley's granite walls draw thousands of climbers from around the world each year. Climbing in the Valley includes wilderness/adventure climbing, traditional climbing, big wall climbing, recreational climbing, sport climbing, speed climbing, bouldering, big drop rappelling, and free solo climbing. The concessioner offers a mountaineering school in the Valley, and Camp 4, located near popular climbing routes and features, serves as an unofficial climbers' camp. Climbers often stage their trips (equipment preparation and parking) in turnouts near the start of their climbs. Because of the proximity of popular climbing walls to Valley roads and turnouts, climbing observation has also become a popular visitor activity (NPS 2000a).

Picnicking. Visitors to the Yosemite Lodge area enjoy picnicking at designated tables outside the Food Court and at tables for designated campers at Camp 4, which has grills. Informal picnicking at the Lodge outdoor amphitheater and adjacent meadow and riverside areas, as well as tailgate picnicking at parking areas, are also popular.

Other Activities. Swimming, wading, fishing, rafting, and use of non-motorized watercraft are common activities in the Merced River, south of the Lodge. In addition, the Lodge includes a swimming pool.

Except where posted, all designated trails in the park are open to stock and are maintained to accommodate stock traffic.

Winter activities include, but are not limited to, cross-country skiing and snowshoeing. Most ski routes follow summer trails or traverse the Valley's open meadows (NPS 2000a).

Auto touring by private vehicle is prevalent in the Lodge area along Northside Drive and other Lodge area roadways. A variety of tours is available for visitors choosing to explore Yosemite by means other than private vehicles and can be arranged at Yosemite Lodge's tour/activities desk. Services are provided by Yosemite Transportation System, which is operated by the park concessioner. A 26-mile, two-hour motor coach tour of the Yosemite Valley floor departs several times daily from the Lodge. In winter, this tour is conducted in motor coaches; in spring and summer, visitors ride in open-air trams.

Orientation and Interpretation

Orientation. Visitors to Yosemite National Park can use park and other information resources to plan their visits. Yosemite's web site provides information about park lodging and activities, and the park's public information office mails previsit materials to those requesting them by phone or mail. The Yosemite Association also offers an interactive web site, allowing more in-depth orientation, and sells books and maps. The park also provides assistance (updated information, publications, and seasonal staffing) to local, multi-agency visitor centers where visitors can stop en route. Once at park entrance stations, visitors receive free park publications with trip and activity planning information; these materials are also available on the park's web site (NPS 2000a).

The park's principal visitor center is located in Yosemite Village and features the park's orientation film (NPS 2000a). The tour/activities desk located in the Yosemite Lodge registration building provides additional information, such as arrangements for tours, transportation, Yosemite Mountaineering School classes, trail rides, and other activities. The information kiosk at Camp 4 also provides additional visitor orientation information.

Wayfinding methods for visitors in the Valley are limited to the free publications and the park map distributed at entrance stations and visitor centers. Visitors can gain limited information from roadside signs throughout the park. Many trails are marked with directional and mileage signs, but a general knowledge of the locations of these destinations is often necessary to use them. In the project area, informational and directional signs for trails and multi-use paved trails are limited, and the connection between the trailhead sign at the Camp 4 parking area and the Valley Loop/Yosemite Falls Trail system is unclear.

Interpretation. Park interpreters serve a primary resource preservation role by conveying information to visitors and park employees about the importance of park ecosystems and the relationships among various park resources. Interpretation is provided to park visitors in the form of walks, talks, evening programs, exhibits, school programs, etc., including educational programs provided by park rangers and park partners. The interpretive staff provides information to visitors about wilderness resources, policies, regulations, conditions, and trails at information centers, in programs, on roving contact assignments, and during motor coach and tram tours of the Valley. Interpretive programs offered by the park are instrumental in providing education and thus lessening or preventing resource impacts.

Several interpretive facilities are located in Yosemite Village, to the east of the Yosemite Lodge Area Redevelopment site. In the project area, interpretive programs are held at the outdoor amphitheater, where interpreters provide nightly ranger/naturalist programs, slide presentations, and scenic movies during the summer. Evening programs are held in the Yosemite Lodge Cliff Room during the remainder of the year.

Visitor Services

Overnight Accommodations. On weekends and many weekdays during the summer, lodging rooms and campsites in Yosemite Valley are usually fully occupied. Yosemite Lodge has 245 lodging units, consisting of rooms that are similar in size to standard hotel rooms. (Camping opportunities in the Yosemite Lodge Area Redevelopment site are described under Recreation.) The average length of stay for overnight visitors is estimated to be 2.7 nights. On an average day, about 37% of the rooms and campsites turn over. On a typically busy day, about 2,363 new overnight visitors arrive and begin their stay in the Valley (NPS 2000a). Overnight accommodations at Yosemite Lodge and Camp 4 are described in detail in Chapter II, Alternatives.

Food, Retail, and Other Visitor Services. Yosemite Lodge includes the following food, retail, and other visitor services:

- *Yosemite Lodge Food Court*. Open all year, the food court serves breakfast, lunch, coffee/snacks, and dinner daily.
- *Mountain Room Restaurant*. Full dinner service restaurant featuring views of Yosemite Falls.
- *Mountain Room Bar*. Open all year during the evenings.
- *Nature Shop*. Offers artwork, apparel, music, and videos.
- *Gift and Grocery Store*. Offers sundries, newspapers, gift items, magazines, snacks, jewelry, and apparel items.
- *Snack Bar*. Located next to the swimming pool and open seasonally.
- *Bicycle Rentals*. Bicycle (and wheelchair) rentals available daily from April through October and during the rest of the year, weather permitting.
- *Post Office*. Full service post office, including parcel post (YCS 2002).

In addition, Yosemite Lodge also includes a tour/activities desk, swimming pool, and outdoor amphitheater, as described above. Visitor services at Camp 4 are provided at the information kiosk, which also includes a message/bulletin board.

Night Sky

The night sky plays an important part in the overall visitor experience. The ambient darkness of Yosemite Valley provides outstanding opportunities for stargazing and observing the moon. Safety and security in the park after dark are accommodated through limited lighting in developed areas, such as at Yosemite Lodge, to assure a safe and healthful environment for visitors and employees (NPS 2000a). Yosemite Lodge has external lights on Lodge facilities, at building entrances and decks, and at the amphitheater. Lighting at Camp 4 is incidental and very specific, such as at the doors of the campground restroom and at the information kiosk. The proposed Indian Cultural Center site is undeveloped and does not include lighting. Other light sources in the project area include campfires as well as car headlights in parking areas and along roadways.

The Valley floor is extremely dark at night, largely due to the Valley walls and limited sky exposure. Unlike urban or suburban settings, there is essentially no ambient light. There is no lighting for roads in the Valley, such as along Northside Drive, other than car headlights.

Lighting on the Yosemite Lodge grounds, and at Camp 4 to a limited degree, introduces an element of light trespass (i.e., where light intended to illuminate one area illuminates other areas nearby) or light pollution (i.e., outdoor lighting that emits stray light upwards, illuminating clouds, dust, and other airborne matter and obscuring the night sky).

Socioeconomics

Regional Setting

This section examines the economic environment in the region affected by the Yosemite Lodge Area Redevelopment. The discussion of the economic environment provides a description of: (1) regional economies (Madera, Mariposa, and Tuolumne Counties combined); (2) the current visitor populations; and (3) employee housing conditions (NPS 2000a).

A socioeconomic profile was prepared for each county in the affected region in order to provide a general characterization of recent demographic and economic conditions, and to present the baseline statistics to be used in the impact analysis of the alternatives. The baseline serves as a measure of the region's economic environments and is used to evaluate the magnitude of potential impacts on the counties due to implementation of the proposed alternatives. Unless otherwise noted, all figures are presented in 2001 dollars. When necessary, the figures were adjusted into 2002 dollars using the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers (NPS 2000a).

The primary data source used to compile the economic baseline was IMPLAN, an economic model that estimates the effects on a specific economy from changes in spending. The Minnesota IMPLAN Group provides county-specific data on output, income, employment, and other economic variables as part of its input-output system. For information that is not provided by IMPLAN, such as forecasts of employment trends, population, and taxable sales, other data sources were used.

Regional Context

Yosemite National Park encompasses parts of three counties (Madera, Mariposa, and Tuolumne) and borders a fourth (Mono County) (NPS 2000a). For the purposes of this analysis and due to the scope and nature of the proposed project, the affected region is defined as the three-county

area of Madera, Mariposa, and Tuolumne Counties, since this was determined to be the likely area encompassing the majority of the local employment and spending expected to be related to the Yosemite Lodge Area Redevelopment construction.

Madera County. The total employment in Madera County is estimated to be 37,500. The central economic activity in Madera County is agriculture, which in 2001 constituted over a quarter of the county's total employment. The government and services sectors are the next two largest industries in Madera, each accounting for approximately 20% of the total employment. Trade and manufacturing industries also contribute substantially to local employment, with an estimated 5,700 and 3,700 employees, respectively (EDD 2002a).

Nonagricultural wage and salary employment in Madera County is forecast to increase in the services, retail, and government sectors from 1999 to 2006. The service industry is expected to grow by 1,400 jobs, which would represent a 19.2% increase. Corresponding job increases of 15% and 9.6% are projected for the retail and government sectors (EDD 2002a).

Mariposa County. Recreation and tourism are major industries in Mariposa County. The county's primary recreation area/tourist attraction is Yosemite National Park, part of which lies within the county. Other major recreation areas near Mariposa County include the Stanislaus and Sierra National Forests (NPS 2000a).

Total employment in Mariposa County is estimated to be 4,830. Lodging, food and beverage, and other service industries are central to the county's economy, accounting for over 40% of employment in Mariposa County. Government is also a major economic sector in the county, accounting for nearly 35% of employment. Other industries, such as construction (4.1%) and manufacturing (3.2%), are relatively limited (EDD 2002b).

Nonagricultural wage and salary employment in Mariposa County was projected to increase by approximately 840 jobs (17.4%) from 1999 to 2006. Employment in all county industrial sectors is projected to experience growth, with the exception of the finance, insurance, and real estate sector, which is projected to be unchanged. Nearly half the growth is expected to occur in the service industry (EDD 2002d). Yosemite National Park is expected to provide the main catalyst for job growth, primarily in the recreation and tourism industries and in associated health services. Retail trade is expected to create additional jobs in the county, primarily in food stores, gas stations, and eating and drinking establishments (NPS 2000a).

Tuolumne County. The tourism industry and government sector are of primary importance to the county's economy. Yosemite National Park is in the southeastern portion of Tuolumne County. Columbia State Park, Stanislaus National Forest, Dodge Ridge Ski Area, and Leland Meadows are among the many other state and federal parks and recreational areas in the county. Total employment in Tuolumne County is estimated to be 16,000. The government sector, accounting for 28.2% of employment, is the largest employer in Tuolumne County, followed by services (26.4%), retail trade (22.8%), manufacturing (7.7%), and construction (6.8%) (EDD 2002c).

Nonfarm employment in Tuolumne County is projected to grow by 1,790 jobs (11.9%) from 1999 to 2006 as the local economy experiences continued population growth. Most of the job growth is expected in the services, retail trade, and government sectors (EDD 2002c).

Population

In 2002, the total population of the affected region was nearly 203,000. Madera County is the most populated county, with approximately 130,000 residents. Mariposa County has the smallest population of the three counties, with an estimated 17,250. Table III-6 provides population figures for the three counties (EDD 2000a,b,c).

The populations of all three counties are predicted to grow steadily through the year 2040 (see table III-7). Although the actual 2002 population levels for Madera and Tuolumne Counties (see table III-6) have been below the California Department of Finance's projections in 1998 (see table III-7), the per-decade rate of population growth is expected to increase during the first decade of the 21st century before declining over the subsequent decades (NPS 2000a).

Table III-6
County Populations

County	Population (2002)
Madera	129,700
Mariposa	17,250
Tuolumne	55,800
Total	**202,750**

SOURCE: EDD 2002a,b,c

Table III-7
County Population Projections, 1990-2040

County	1990	2000	2010	2020	2030	2040
Madera	89,800	134,000	171,800	214,100	262,900	317,900
Mariposa	14,500	16,700	20,700	23,400	26,000	28,600
Tuolumne	48,600	56,100	68,400	77,400	86,000	95,000
Total	**152,900**	**206,800**	**260,900**	**314,900**	**374,900**	**441,500**

SOURCE: California Department of Finance 1998; NPS 2000a

Employment

Recent employment and output statistics for the Yosemite region provide the appropriate baseline to evaluate the magnitude of estimated construction-related economic impacts. These baseline statistics are presented in tables III-8 and III-9. The employment figures include all waged and salaried positions in each county. Self-employed workers are not included. The employment figures include both full-time and part-time workers. The California Employment Development Department (Labor Market Information Division) estimates that the total civilian labor force residing in the three-county region in 2000 was 83,080, of which approximately 74,800 were employed. All three counties have unemployment rates above the national and state averages. The region's average rate of unemployment in 2001 was approximately 10% (EDD 2002a,b,c).

Table III-8 provides total county employment estimates by sector, showing the jobs located within the region. The figures are used as the baseline for employment conditions.

Table III-8
2002 Employment by Major Industry

Industry Sector	Madera	Mariposa	Tuolumne	Total
Agriculture	9,400	20	190	**9,670**
Construction & mining	1,700	140	940	**3,070**
Manufacturing	3,700	190	1,230	**5,150**
Transportation, public utilities	1,100	90	430	**1,680**
Trade	5,700	700	3,850	**10,270**
Finance, insurance, real estate	600	90	540	**1,240**
Services	7,600	1,890	4,250	**14,400**
Government	7,700	1,710	4,570	**14,280**
Total	**37,500**	**4,830**	**16,000**	**59,760**

NOTE: Totals may not add up exactly due to rounding

SOURCE: EDD 2002a,b,c

Table III-9
Estimated 2000 Industry Output by County by Sector (in Millions of 2002 Dollars)

Industry Sector	Madera	Mariposa	Tuolumne	Total
Agriculture	$1,028.6	$27.0	$42.2	**$1,097.8**
Construction & mining	$307.0	$51.5	$222.9	**$581.4**
Manufacturing	$941.5	$50.4	$328.8	**$1,320.7**
Transportation, public utilities	$413.8	$62.4	$190.0	**$666.2**
Trade	$267.4	$16.9	$116.5	**$400.9**
Finance, insurance, real estate	$470.9	$98.2	$300.7	**$869.8**
Services	$733.0	$247.5	$471.1	**$1,451.5**
Government	$346.2	$85.1	$231.8	**$663.1**
Total	**$4,508.5**	**$639.1**	**$1,904.0**	**$7,051.5**

NOTE: Totals may not add up exactly due to rounding

SOURCES: Minnesota IMPLAN Group, Input-Output System B IMPLAN, Dornbusch & Company, Inc. and ESA (NPS 2000a). Output adjusted using U.S. Bureau of Economic Analysis regional accounts data for local area personal income (U.S. Department of Commerce, Bureau of Economic Analysis 2003) and the Consumer Price Index – All Urban Consumers (U.S. Department of Labor, Bureau of Labor Statistics 2000)

Economic Output

Economic output is a measure of productivity and is calculated differently depending on the type of goods in question. For the agricultural sector, output is measured by the value of products sold. In the manufacturing sector, output is a measure of the value added by the manufacturer, or the value of shipments. In the wholesale trade and retail trade sectors, output is the value of sales. In the service sector, output is measured as receipts in dollars (NPS 2000a).

As shown in table III-8, the estimated total output of goods and services for the three counties in 2000 was over $7.0 billion (2002 dollars). Madera County's output represents more than 60% of this total, at more than $4.5 billion (2002 dollars). Mariposa County's proportion is less than 10% of the affected region's total. The service industry sector is the largest economic sector (according to output) in Tuolumne and Mariposa Counties (NPS 2000a).

Visitor Population

Annual visitation has decreased since the 1997 flood and currently averages around 3.5 million visitors a year. Three categories of visitors can be identified among park visitors: park overnighters, local overnighters, and day visitors. Park overnighters are park visitors who lodge or camp overnight within the park. Overnight visitation within the park is controlled by the National Park Service and limited by the availability of lodging and camping facilities. Local overnighters are park visitors who lodge or camp within the Yosemite region outside the park during their trip. Typically, these visitors spend several days visiting the park. Day visitors are park visitors who either do not lodge or camp overnight in the region, or who are local residents (NPS 2000a).

The 1997-1998 Yosemite Area Regional Transportation Strategy visitor survey provides the most recent and reliable information on Yosemite visitation. According to the survey results and the population definitions described above, it is estimated that park overnighters constitute about 20%, local overnighters 40%, and day visitors 40% of the park visitor population (NPS 2000a).

Analysis of past visitation between 1981 to 1996 indicated that overnight visitation to the park was relatively unchanged, at a level of approximately 2.1 million overnight stays per year by approximately 775,000 visitors. Following the 1997 flood, the number of park overnight visitors decreased by approximately 170,000 visitors, primarily due to the loss of campsite and lodging capacity. The current annual park overnight visitation is estimated to be approximately 590,000, with an average length of stay of 2.7 days in the region per Yosemite visit. Average total daily spending is $67.60 per capita (in 2002 dollars) (NPS 2000a).

Project Setting

Visitor Facilities

A wide variety of lodging, food and beverage, retail, and other visitor services are located within the project area. There are 245 motel-style rooms operating at Yosemite Lodge and 37 campsites at Camp 4. The existing rooms are considered midscale lodging. Midscale lodging includes lodging facilities that have a moderate number of amenities and are priced between the rates for deluxe and economy rooms within the park. As required by law, the National Park Service sets lodging prices within the park based on market forces and other relevant factors, including a review of room rates at comparable facilities operating under similar conditions in California. In 2002 dollars, double-occupancy prices for midscale lodging in 1999 ranged from $84 to $124 (plus tax), depending on room type and season. In comparison, economy lodging in 1999 ranged from $49 to $81 (in 2002 dollars) (NPS 2000a).

In addition to the lodging facilities, there are numerous other visitor facilities within the Yosemite Lodge Area Redevelopment site. In addition to the registration building and housekeeping facilities that support the lodging operation, there are several food and retail facilities within the project site. The food and retail facilities consist of three restaurants (including the Food Court, Mountain Room, and the currently closed Garden Terrace Room), the Nature Shop, the main gift and grocery store, a seasonally operated snack bar, and the Mountain Room Bar. The Cliff Room meeting space is primarily used for interpretive programs, group meetings, and other special functions.

Other visitor facilities within the Yosemite Lodge Redevelopment Area include an outdoor amphitheater, swimming pool, post office, and bicycle rental stand.

Yosemite Lodge is operated by the park concessioner, Delaware North Corporation at Yosemite, under contract with the National Park Service (NPS 2000a). Under the terms of the concession agreement, the National Park Service owns the facilities within the park. In cases where the concessioner makes major capital improvements to the park's buildings and facilities, the concessioner may retain a possessory interest in the facility improvements, which will gradually depreciate over time. If the concessioner's possesory interest in the facilities has not fully depreciated at the end of its contract, then the concessioner is entitled to reimbursement by the federal government of its remaining undepreciated value.

After the 1997 flood, the number of lodging units and campsites within Yosemite Valley decreased substantially. The high occupancy rates for Valley lodging and campgrounds both before and after the 1997 flood indicate that a strong demand for lodging and camping within the Valley. While new lodging facilities outside the park provide more lodging alternatives for park visitors, occupancy at Yosemite Lodge and Camp 4 has remained high. Both the Lodge and Camp 4 operate at full capacity from late spring through early fall, and most accommodations are sold out a year in advance for the summer months, weekends, and holidays (NPS 2000a).

Employee Housing

Temporary modular housing (82 beds) was established within the project area to offset employee housing lost in the January 1997 flood. In addition, the Yosemite Lodge cabins provide eight beds for employees.

Transportation

Regional Setting

Highway Access to Yosemite National Park

Each state highway leading to Yosemite National Park is a paved, primarily two-lane road originally built to carry traffic over mountainous terrain at moderate to high speeds. All of the park entrance routes are characterized by segments of steep grades, winding curves, and narrower sections as they approach the park. Highways 140 and 120 provide access from the west. Highway 140 connects to Highway 99, a principal north-south highway about 70 miles from the park at Merced, and travels through the gateway community of Mariposa on its route to the park. Highway 120, which intersects with Highway 99 north of Modesto, passes through the gateway community of Groveland en route to the park. The most direct southern access to the park is from Fresno along Highway 41, which passes through the gateway communities of Oakhurst and Fish Camp en route to the park. Travelers from the east rely on Highway 120 as the exclusive access route. Highway 120 connects to Highway 395 at Lee Vining, about 15 miles from the Tioga Pass Entrance Station; this eastern access route is closed during the winter.

Park Entrances

Visitors enter the park through four primary locations: the South, Big Oak Flat, Arch Rock, and Tioga Pass Entrance Stations. The South Entrance, connecting to Highway 41 from Fresno, receives the greatest amount of visitor traffic, followed closely by the Arch Rock Entrance to the west. The Arch Rock Entrance is used not only by visitors, but also by the majority of park employees who commute to Yosemite Valley. Tioga Pass is open only during the summer and early fall and is used most commonly by visitors making a trans-Sierra trip. Congestion is a recurring problem at all of the park entrance gates during high visitation days.

Project Setting

Access roads into Yosemite Valley enter near the west end of the Valley and merge into Southside Drive, a two-lane, one-way eastbound road that parallels the south side of the Merced River. Northside Drive, a westbound road that is parallel to and north of the Merced River, is two-way in the segments adjacent to Yosemite Village, the Lower Yosemite Fall area, and Yosemite Lodge. It converts to one-way travel from just west of Yosemite Lodge to Pohono Bridge.

Northside Drive, Southside Drive, and Sentinel Bridge Road (the road connecting Northside Drive and Southside Drive south of Yosemite Village) are the major thoroughfares traversing Yosemite Valley. Northside Drive, located north of the Yosemite Lodge area, is well traveled by vehicles and bicycles, both for accessing points within the Valley (including the Yosemite Lodge and Camp 4) and as an exit from the Valley. The roadway internal to the Yosemite Lodge bisects parking areas (with multiple access points) and divides some of the lodging units from the common facilities (e.g., restaurants, retail stores), which leads to inefficient turning movements and multiple pedestrian crossings that adversely affect traffic flow and traffic safety conditions.

Most visitors to Yosemite travel by private vehicle, but tour buses accommodate a significant percentage of visitors. It is assumed that all tour buses visit the Valley during their stay in the park. In addition, a small number of visitors use regional transit buses operated by VIA Adventures, Inc./ Grayline of Yosemite and the Yosemite Area Regional Transportation System.

Traffic counts taken at the El Capitan crossover roadway indicate that about 10% of the traffic that enters the east end of the Valley near the Yosemite Chapel is recirculating from Northside Drive via the El Capitan Bridge (NPS 2001b).

Shuttle bus systems in Yosemite Valley have operated in some form since the late 1960s. The current shuttle system operates year-round, offering service to the major developed areas at the east end of Yosemite Valley. During the summer months, a fleet of shuttles operates at 5- to 10-minute intervals on an 8-mile loop with 21 stops. Fewer shuttles and a reduced schedule are operated for the remainder of the year. Shuttle stops are adjacent to major destinations in the east end of the Valley, such as Yosemite Lodge and Lower Yosemite Fall.

Parking spaces are provided in the Yosemite Lodge area for guests at Yosemite Lodge (245 spaces) and for day visitors (219 spaces). There also are 111 guest parking spaces at Camp 4, including parking spaces for staff at the search and rescue site. There are no parking spaces at the proposed Indian Cultural Center site.

The Yosemite Lodge site also includes 30 bus parking spaces, which accommodate 15 overnight buses and up to 30 day-visitor buses. Overnight and day-visitor buses share bus parking spaces.

Because of high traffic volumes during peak visitation periods and congestion at major intersections, conflicts occur between vehicles and pedestrians when pedestrians cross roads to reach Valley attractions. Traffic congestion and pedestrian and vehicle conflicts are continuing problems along Northside Drive in the Yosemite Lodge and the Lower Yosemite Fall area. Northside Drive pedestrian crossings between Yosemite Lodge and Lower Yosemite Fall contribute to traffic congestion, and during peak periods can result in vehicle queues backed up to the Yosemite Village area.

Transportation Conditions

Level of service is a measure of how well a roadway is operating under the analyzed traffic conditions, using information such as roadway geometrics, vehicle volumes, and the composition of the traffic stream. Level of service ranges from A to F, with A being the best and F the worst. Typically, traffic flowing in the level of service A to D range has acceptable operations, depending on the setting. Level of service E and F indicate unacceptable operations.

The two-way operation of Northside Drive between Yosemite Village and Yosemite Lodge, and the very high volumes of traffic using this stretch of road to exit the Valley, lead to congested conditions during busy summer days. Northside Drive is operating at level of service E during the outbound peak hour between Yosemite Village and Yosemite Lodge. The intersection on Northside Drive at the Lower Yosemite Fall parking lot is operating at level of service F. Southside Drive is operating at level of service D during the inbound peak hour at Yosemite Chapel.

Interruptions to traffic flow (such as accidents or vehicles stopping in the travel lanes to view features or wildlife) can affect traffic flow, causing higher levels of congestion than those indicated by the calculated level of service. Road conditions, including damage and weather-related hazards, can also cause increased congestion.

Park Operations and Facilities

Regional Setting

Park operations fall into five basic categories: resource management, visitor protection, interpretation services, facility management, and concessions management. Resources management staff protect the natural, historic, and cultural resources of the park. Visitor protection staff perform various visitor management and resource protection duties, including enforcing laws, resolving disputes, providing emergency medical treatment, fighting fires, staffing wilderness ranger stations, and conducting search and rescue operations. Interpretation staff conduct interpretive programs, such as ranger-led talks, tours, and walks. Facility management staff perform preventive and corrective maintenance on park infrastructure, including water, wastewater, and electrical utility systems, and park roads, trails, and structures. Concessions management staff manage and monitor the operations and activities of the park's concessioners. The extent and condition of park infrastructure and facilities within Yosemite National Park are described below.

Visitor Facilities

Campgrounds. Camp 4 is one of five public campgrounds in Yosemite Valley. The other campgrounds include Upper Pines (250 campsites), Lower Pines (78 campsites), North Pines (86 campsites), and Backpackers (30 campsites), all located east of Yosemite Village approximately 1.5 to 2 miles east of the project site. Camp 4 and Backpackers are walk-in campgrounds, and the others are drive-in campgrounds.

Overnight Facilities. Yosemite Lodge is one of four concessioner-operated facilities providing overnight accommodations in Yosemite Valley; the others are Curry Village, Housekeeping Camp, and The Ahwahnee. The National Park Service maintains utility service (including water supply, wastewater systems, and electricity) to these facilities.

Infrastructure and Facilities

Trails. The Valley Loop Trail, an unpaved pedestrian and stock trail, follows the base of the Valley walls on both sides of Yosemite Valley between Happy Isles and the Tenaya Creek bridge at the eastern end of the Valley and the Pohono Bridge at the western end. A paved, multi-use loop path extends on both sides of the Merced River between Swinging Bridge (southwest of Yosemite Lodge) and Stoneman Bridge (near Curry Village).

Roads. The National Park Service maintains approximately 200 miles of road within Yosemite National Park, divided among the following Federal Highway Administration categories: 127 miles are major park routes, 10 miles are minor park routes, 34 miles are special-purpose routes, 9 miles are administrative routes, and 19 miles are one-way routes. Major park routes include El Portal Road, Northside and Southside Drives in Yosemite Valley, Big Oak Flat Road, Tioga Pass Road, and Wawona Road. Minor routes within the park consist primarily of those for administrative use or those open only to bicycles, shuttle buses, or to designated vehicles used by disabled visitors. The park road system is in fair physical condition.

Bridges and Tunnels. The Yosemite road system includes approximately 4 tunnels and 30 bridges, each of which has unique maintenance issues and requirements. Bridges within the park are generally in good condition, with a few exceptions.

Utilities. There are 20 public water systems in the park; the Tuolumne Meadows and Wawona areas have the only large surface water systems. Three wells, a 2.5-million-gallon water storage tank, and several distribution lines supply Yosemite Valley users with water. The system has the capacity to produce about 3.8 million gallons per day. Major components of the water system are being replaced and upgraded due to damage sustained in the 1997 flood. These improvements will restore reliability to the system, provide monitoring of system conditions, and allow for remote control of pumping. Five wastewater treatment facilities are located within the park, in El Portal, Hodgdon Meadow, Tuolumne Meadows, Wawona, and White Wolf. The National Park Service purchases power from the Pacific Gas and Electric Company, which it distributes and resells to end users in Yosemite Valley, predominantly to the concessioner. SBC Communications supplies telephone service to Yosemite Valley and El Portal, primarily through microwave transmission. Overhead and underground lines serve various other locations throughout the park and El Portal.

Project Setting

Park facilities and infrastructure within the Yosemite Lodge Area Redevelopment site include visitor facilities, trails, roads, bridges, and utilities.

Visitor Facilities

Campgrounds. Camp 4 has 37 walk-in campsites, one search and rescue campsite, and a restroom building with an outdoor utility sink. The search and rescue site has nine tent cabins and provides year-round accommodations for approximately nine search and rescue volunteers.

Lodge Facilities. Yosemite Lodge provides 245 lodging units. In addition to overnight accommodations, facilities at Yosemite Lodge include a post office, three restaurants (including the Food Court, Mountain Room, and the currently closed Garden Terrace Room), a bike rental facility, and gift shops. Except for the post office, all are operated by the park concessioner. The

National Park Service is responsible for maintaining utility service (including water supply, wastewater systems, and electricity) for Yosemite Lodge. A visitor survey conducted over a period of three days in August 1999 counted an average of 318 visitors per hour (between 11 a.m. and 7 p.m.) at various public areas of Yosemite Lodge, including restaurants, paths, picnic areas, shops, restrooms, shuttle stops, and outdoor circulation areas (NPS 2000f).

Roads and Trails

Yosemite Falls Trails. Yosemite Falls is a highly popular visitor destination close to the project site. A quarter-mile paved pedestrian trail to the base of Lower Yosemite Fall is located across Northside Drive at the east end of Yosemite Lodge. A restroom facility and trash cans are provided adjacent to the trail near Northside Drive. The former parking area at this location was removed and a picnic area is being constructed as part of the Lower Yosemite Fall Project, which is currently being implemented. A visitor survey conducted over a period of three days in August 1999 counted an average of 443 visitors per hour at the Lower Yosemite Fall area (NPS 2000f). The trail to the top of Yosemite Falls begins from the Valley Loop Trail behind (north of) Camp 4. This paved trail travels to the top of the upper fall and has a 3,200-foot elevation gain. Both trails are among the most popular in Yosemite Valley.

Valley Loop Trail. In the project vicinity, the Valley Loop Trail (see figure III-1) follows the base of the northern Valley wall from north of the Indian Cultural Center site and Camp 4 to its junction with the Yosemite Falls Trail near Northside Drive.

Multi-use Paved Trails. The paved, multi-use paved trail extends between Swinging Bridge and Yosemite Creek Bridge in the project vicinity. North of Swinging Bridge, the path follows the north side of the Merced River and the southern boundary of Yosemite Lodge, then crosses onto the Yosemite Lodge site and follows on-site roadways and sidewalks to Northside Drive, crosses the roadway, and continues across the pedestrian bridge over Yosemite Creek.

Northside Drive. Northside Drive is the northern half of the two-lane loop road leading into (on Southside Drive) and out of (on Northside Drive) Yosemite Valley. Northside Drive transects the Yosemite Lodge Area Redevelopment site, passing north of Yosemite Lodge and south of Camp 4 and the Indian Cultural Center site (figure III-1). Northside Drive carries two-way traffic between Yosemite Village and Yosemite Lodge and one-way, outbound traffic west of Yosemite Lodge.

Bridges

Northside Drive crosses Yosemite Creek on the Yosemite Creek Bridge northeast of Yosemite Lodge. The Yosemite Creek Bridge, a cast-in-place concrete arch superstructure with a stone veneer, was constructed in 1921. According to a recent preliminary assessment of its condition (Martin and Martin 2003), the bridge apparently has not had any major repairs or rehabilitation work. The assessment found that the bridge is functionally substandard, in terms of roadway width, bridge barrier height, vertical geometry (sight distance), and adequate approach guardrail, relative to current *Park Roads Standards* (NPS 1984). In addition, the bridge may be under capacity in terms of its load-bearing capability. The assessment noted that many bridges today do not meet current standards and are managed in various ways depending on the deficiency. In addition, the assessment notes that National Park Service facilities are not typically required to meet the same standards as state or federal highways (Martin and Martin 2003). The Yosemite Creek Pedestrian/Bicycle Bridge crosses the creek just north of the Yosemite Creek Bridge.

Utilities

Northside Drive is a major utility corridor for Yosemite Valley. Underground pipelines along Northside Drive include sewage, water, power, and telephone lines. Existing water, sewer, and power lines are located beneath Yosemite Lodge and Camp 4 (see figure III-3). Underground water, sewer, and power lines also are located at the Indian Cultural Center site, but are no longer in use or are connected to lines in use at Camp 4 or Yosemite Lodge (NPS 2002h). Since various Yosemite Lodge structures and facilities have been located on both sides of Northside Drive in the site vicinity since the early 1900s, other abandoned underground utility lines may exist in the vicinity of Northside Drive.

Water Supply. Water is produced and chlorinated at three groundwater wells near Yosemite Lodge. The water is pumped to a 2.5-million-gallon storage tank at Happy Isles, from which drinking water is distributed to users throughout Yosemite Valley.

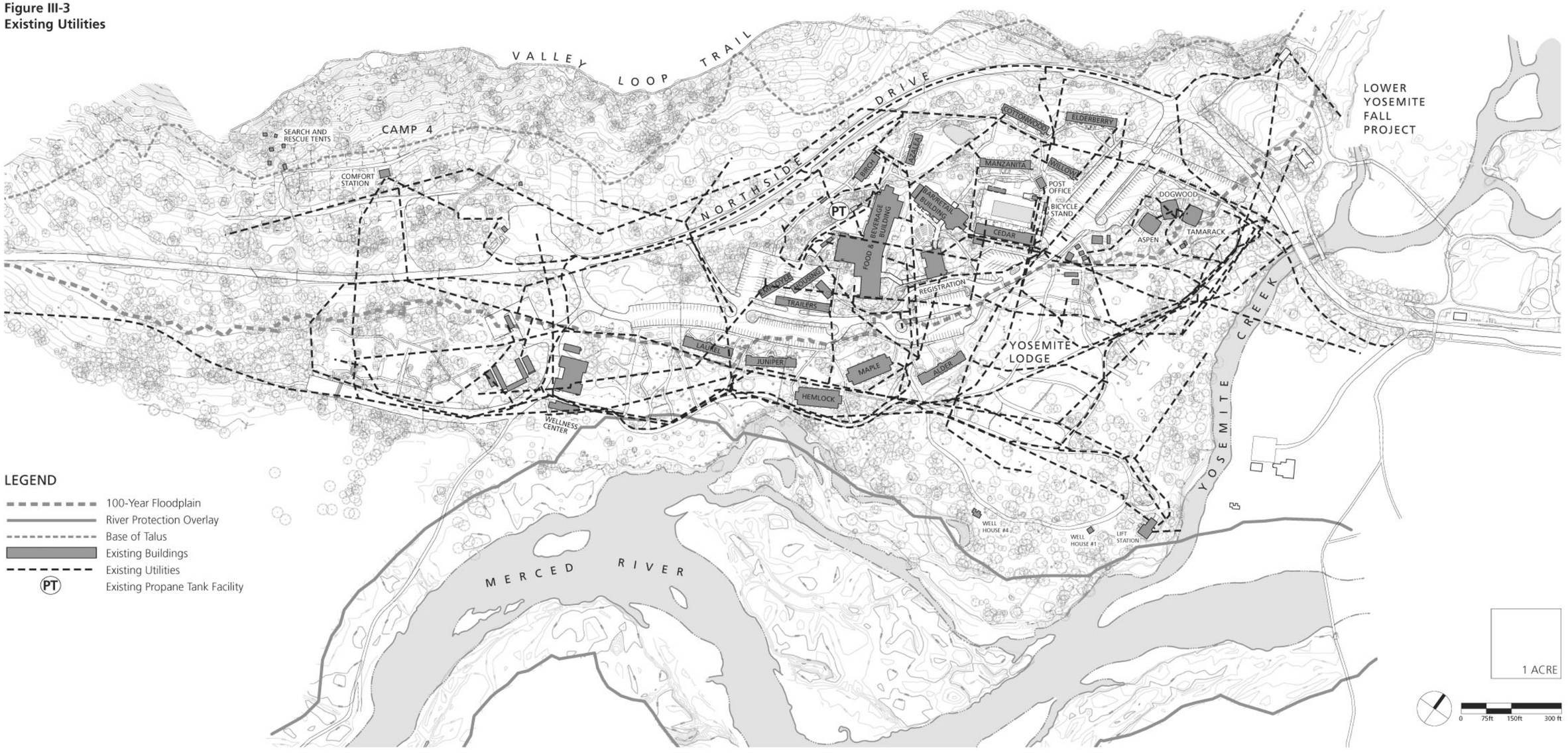
The water system at Yosemite Lodge includes pipelines of various materials, age, and size. In general, the existing system is old and deteriorated. Many of the gate valves within the system are inoperable, causing maintenance and operation difficulties. The pressure-reducing valve at the delivery location to the Yosemite Lodge system is inoperable and is fully open. Portions of the system were installed in the 1940s. As a general rule, however, water lines that are more than 50 years old are not considered reliable (Sasaki 2002). The specific sizes, capacity, and condition of the water system are not known at this time (Provost & Pritchard Engineering Group 2003).

The water line to Camp 4 extends from the Yosemite Lodge water system at a point in the vicinity of Birch and Azalea Cottages. The line generally follows the north side of Northside Drive, angling away from the road toward the restroom at the parking lot, and terminates near the western boundary of the campground, near the Indian Cultural Center site. There are water lines beneath the Indian Cultural Center site, according to a schematic utility plan for the area, but they apparently are no longer connected to a currently used water main (NPS 2002hi).

Water usage can be estimated from known wastewater flows, which are commonly assumed to represent 90% of water used within a given system. Based on wastewater flow monitoring and hydraulic modeling conducted as part of a capital improvement plan for the sewer system (discussed in the following section), existing average daily water demand for the project area is estimated to be 90 gallons per minute, peak daily water demand is 179 gallons per minute, and the peak hourly demand is 358 gallons per minute (Kennedy/Jenks Consultants 2002). The capacity of the current water delivery system at Yosemite Lodge and Camp 4 is adequate for typical levels of use (NPS 2002c). The fire suppression capability of the water system is considered generally adequate (NPS 2003b).

Wastewater. The January 1997 flood revealed the poor condition of sewer lines in Yosemite Lodge and Camp 4. Since then, the National Park Service has relined 485 linear feet of sewer line between the Camp 4 restroom and Yosemite Lodge, and relocated and replaced approximately 2,330 linear feet of sewer line along the southern portion of Yosemite Lodge (NPS 1998e; Sasaki 2002). The National Park Service has developed a sewer system capital improvement plan to ensure the reliability of the existing system and provide a basis for future redevelopment proposed in the *Yosemite Valley Plan* (Kennedy/Jenks Consultants 2002). The capital improvement plan assessed the condition and capacity of the existing sewer lines throughout Yosemite Valley and developed time-phased recommendations for rehabilitation. The assessment

Figure III-3
Existing Utilities



SOURCE: National Park Service, and Provost & Pritchard Inc.

assigned the following priority levels to segments of the sewer lines, depending on the urgency of needed rehabilitation: emergency, immediate, intermediate, and long term. The assessment identified one segment of the sewer line between the Yosemite Falls restroom and the recently replaced line at the south end of Yosemite Lodge, near the eastern boundary of the project site, as needing emergency repair. The assessment assigned immediate, intermediate, or long-term rehabilitation priority to other segments of the sewer system within the Yosemite Lodge Area Redevelopment site.

To evaluate current flows and system capacity, the capital improvement plan identified nine collection basins within Yosemite Valley. The Yosemite Lodge Area Redevelopment site is within Area 6. The assessment, which included monitoring of existing flows as well as hydraulic modeling, determined that the existing average daily flow for Area 6 is 81 gallons per minute, peak daily flow is 161 gallons per minute, and the peak-hour flow is 322 gallons per minute. The average daily flow is based on monitoring, and the peak daily and hourly flows were calculated by multiplying the average flow by two and four, respectively. These multipliers are conservative and are considerably higher than maximum daily and peak hourly flows that were monitored at Area 6 (104 and 155 gallons per minute, respectively). The capacity assessment identified existing average-day deficiencies for most of the sewer lines serving the project area: the sewer line between Camp 4 and Yosemite Lodge, a line within the core of the Yosemite Lodge site, the line that follows the southern boundary of Yosemite Lodge, and the line (previously identified as needing emergency repairs) on the eastern end of the project area, between Yosemite Lodge and the Yosemite Falls restroom (Kennedy/Jenks Consultants 2002). In addition to a deficiency of sewer line capacity for existing facilities at Camp 4, the 14-stall restroom at Camp 4 is somewhat undersized for current demand.

A schematic utility plan for the area indicates that sewer lines once existed at the site of the Indian Cultural Center. Since any lines at this site have not been used in many decades, they are presumed to be substantially deteriorated and to require replacement.

Wastewater is collected at the Yosemite Creek Lift Station, located near Yosemite Lodge and the production wells (see figure III-1). From the lift station, wastewater is pumped to the El Portal Wastewater Treatment Plant outside the park.

Energy. High-voltage electricity is stepped down at the substation below Yosemite Valley and transported to the Yosemite Lodge area via transmission lines underneath El Portal Road and Northside Drive. A small electrical substation is located west of the existing food and beverage building at Yosemite Lodge. Underground electrical distribution lines are located at Yosemite Lodge, Camp 4, and the Indian Cultural Center site. Because utilities at the Indian Cultural Center site were last used between the 1930s and the 1960s, all the existing utility lines and facilities at this site are assumed to be substantially deteriorated and in need of repair or replacement. The electrical distribution line to Camp 4 extends from near the western end of Yosemite Lodge past the site of the former gas station to the Camp 4 restroom. An electrical substation, decommissioned by the National Park Service in the mid-1990s, is located adjacent to Camp 4, west of the site of the former gas station (Kleinfelder, Inc. 1999). Propane provided by a private supplier located outside the park is used for space and water heating at Yosemite Lodge facilities. The propane is supplied via individual, above-ground tanks at the buildings where it is used. Short segments of underground piping connect the tanks to the respective buildings.

Telephone Service. SBC Communications supplies telephone service to Yosemite Valley. The main line serving Yosemite Lodge extends underground from the west side of Yosemite Creek Bridge to the registration building.

Solid Waste Disposal. The National Park Service facilities management division provides solid waste management services to Camp 4. The Yosemite Lodge concessioner contracts with a private hauler for the collection of solid waste generated at the Yosemite Lodge.

Hazardous Materials

Regional Setting

Hazardous materials and hazardous wastes are defined by their levels of toxicity, ignitability, corrosivity, and reactivity. When excavated, soils with concentrations of contaminants higher than certain acceptable levels must be handled and disposed as hazardous waste. A variety of materials have been stored in the park over the last century, often in underground storage vessels. Since 1986, over 100 underground tanks have been located and removed from the park. The park has over 30 known sites of contamination from leaking underground tanks, of which 20 have been addressed. The park also contains an old landfill and 39 former surface dumps. These underground nonpoint pollution sources represent potential contaminant sources for the degradation of water quality.

Project Setting

The Yosemite Lodge Area Redevelopment site has more than 40 buildings and ancillary facilities that occupy approximately 107 acres. Except for a kiosk and a public restroom at Camp 4, all the buildings are located at Yosemite Lodge. The core area of Yosemite Lodge consists of several interconnected common buildings that include the registration area, a cafeteria, two restaurants, a bar, and two gift shops; a swimming pool, post office, and bike rental facility also are located near the center of the complex. Fifteen motel and cottage-style buildings providing overnight visitor lodging are distributed around the core. Ten paved lots provide parking areas close to the lodging facilities and common areas. Other buildings at Yosemite Lodge include a housekeeping facility, a staff Wellness Center, several trailers and small cabins used for staff housing, and several storage and maintenance buildings (see item #5, figure II-1). Ancillary facilities include above-ground propane tanks; a backup generator located near the Yosemite Lodge kitchen; and a 1,000-gallon, above-ground diesel tank, used to fuel a boiler, located at the east end of the site near Tamarack, Dogwood, and Aspen cottages. Chlorine, kept in a solid (briquette) form and used as a disinfectant for the Yosemite Lodge swimming pool, is stored in a double-containment vessel in a storage room at Cedar cottage, adjacent to the pool area (McMichael 2003). Housekeeping chemicals are stored in the housekeeping and maintenance buildings at the west end of the Yosemite Lodge site. Other hazardous materials used for Yosemite Lodge operations are stored at a central warehouse in Yosemite Village (Evans 2002).

The Camp 4 parking lot, located on the east end of the campground, is unpaved. The site of a former gas station is located next to Camp 4, between the parking lot and the campground entrance. The gas station and a leaking underground gasoline storage tank, as well as stained or contaminated soil, were removed following the 1997 flood; groundwater pumping and monitoring wells and equipment used to remediate gasoline released from the tank currently occupy the western edge of the gas station site. A former electrical substation (item #16 on

figure II-1) occupies approximately 4,600 square feet adjacent to Camp 4, west of the former gas station. The substation, which was decommissioned by the National Park Service in the mid-1990s, includes 15 transformers, sealed capacitors, a relay house, and other equipment within a fenced enclosure (Kleinfelder, Inc. 1999).

No buildings remain at the proposed Indian Cultural Center site, which was a residential area from the 1930s to the 1960s. Underground utilities (water, sewer, and electricity) were provided to the site during this time. Remnant underground lines and related facilities (e.g., manholes) remain at the site. No underground tanks are known or believed to exist at this site, although a specific survey for underground tanks in this area has not been conducted.

Water is produced and chlorinated at the three groundwater wells located southwest of Yosemite Lodge, near the confluence of Yosemite Creek and the Merced River. (The two wells west of Yosemite Creek, well houses #1 and #4, are shown on figure II-1; the third well is on the east side of Yosemite Creek.) A chlorination system that administers liquid chlorine to treat the well water is located within each well house. A wastewater lift station is also located in this area, from which Yosemite Valley wastewater is directed to a wastewater treatment plant in El Portal (see figure II-1).

Underground Storage Tanks

Seven leaking underground storage tank sites have been identified at Yosemite Lodge (RWQCB 2003). Five of these cases are considered closed (i.e., remediated) by the Central Valley Regional Water Quality Control Board, which oversees the cleanup of leaking underground tanks, and remediation is underway at the remaining two sites: the former service station next to Camp 4, and a tank at the site of a former staff dormitory at the western end of Yosemite Lodge. All known, unused underground tanks at Yosemite Lodge have been removed; however, it is possible that unknown tanks remain, including fuel tanks associated with a gas station formerly located near the current Yosemite Lodge kitchen loading dock (NPS 2002d). The concessioner maintains two active underground tanks for current operations. A 10,000-gallon tank located near the kitchen loading dock area holds diesel used to run the boiler for operations at the restaurant kitchens. The other underground tank holds 2,000 gallons of diesel and is located near the pool and Cedar cottage. This tank contains fuel for a smaller boiler, which is used to heat the pool. Both tanks are equipped with leak detection monitors and alarms and are maintained and operated according to state and federal regulations (McMichael 2003).

Current remediation activities. Extraction wells, monitoring wells, and a vapor extraction system have been installed to remediate groundwater contaminated by the leaking underground tank at the former gas station next to Camp 4. Remediation of the site continues, with oversight by the Central Valley Regional Water Quality Control Board. Benzene, toluene, ethylbenzene, xylenes, and the oxygenated methyl tertiary butyl ether (MTBE), all components of gasoline, have been identified as constituents of potential concern. In 1999, a risk-based analysis was conducted to evaluate the potential risks of siting residential buildings (staff dormitories) at the gas station site as part of future redevelopment of the Yosemite Lodge area. The analysis concluded that, in the absence of any protective measures, there was a potential for unacceptable levels of risk for future residents as a result of exposure to benzene in indoor air. (Since then, redevelopment plans evolved and structures are no longer proposed for the gas station site.) All constituent concentrations were found to be within acceptable levels for construction activities (i.e., considering the degree and duration of exposure that would be experienced by construction

workers). The analysis noted that constituent concentrations appeared to be decreasing over the site, due to ongoing operation of the vapor extraction system as well as natural degradation processes (Environmental Resources Management 1999).

Diesel contamination is currently being treated at the site of the underground tank at the former staff dormitory, identified as "L Dorm" on the Regional Water Quality Control Board's list. This and other staff dormitories at the west end of Yosemite Lodge were removed after being damaged in the 1997 flood. The underground tank had contained diesel for heaters used in staff lodging. Although this site is listed separately on the Regional Water Quality Control Board list, the plume has mingled with that of the gas station, and the two sites are being managed and remediated as a single site. Active groundwater extraction has been concluded in the vicinity of the L-Dorm tank, and the plume is being monitored. Remediation of the sites is expected to be completed in 2004 (McMichael 2003).

Asbestos, Lead Paint, and PCBs

Lead, asbestos, and polychlorinated biphenyls (PCBs), which may be present in paint, building materials, and electrical equipment, respectively, are recognized as posing health risks. Compared with adults, children are particularly vulnerable to the long-term adverse health effects of lead and PCB exposure. Before the visitor cabins damaged by flooding in 1997 were removed, the National Park Service commissioned a survey of Yosemite Lodge buildings to identify those with asbestos-containing materials (NPS 1997g). The survey also included a spot check for lead and a survey for PCBs at several locations. Almost all of the Yosemite Lodge buildings were surveyed for asbestos; however, samples were not taken of some materials where sampling would have damaged the material and impaired normal system operations and integrity. Of 196 buildings and structures surveyed, only 18 were found not to contain asbestos. A total of 178 buildings were assumed or confirmed to contain asbestos. Of 48 samples taken for the lead survey, 11 tested positive. The buildings testing positive for lead were cabins and one multi-unit cottage within the 100-year floodplain of the Merced River that have since been removed.

PCBs are a mixture of individual chlorinated compounds that have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they do not burn easily and are good insulators. Although no longer produced in the United States, PCBs may be present in products made before 1977. For the PCB survey at Yosemite Lodge, multiple samples were taken at eight buildings. Of these, three samples taken at the Yosemite Lodge cafeteria contained low concentrations of PCBs. These concentrations were found in two air conditioner units and the floor of the air conditioner room. Based on these findings, the report stated that the equipment could remain in place, but recommended that the oil be drained and disposed of prior to an exchange of ownership (NPS 1997g). In their current condition, the PCBs do not present a hazard to human health due to their location and low concentrations. However, if these compounds are disturbed in the course of building renovation or demolition, they must be removed and disposed of in accordance with federal law to preclude potential exposure to the environment.

In 1999, the National Park Service commissioned an assessment of PCBs in the transformers and soil at the decommissioned substation next to Camp 4, in anticipation of removing the substation and restoring the area to more natural conditions. The assessment found PCBs in 4 of 26 pieces of equipment at the site (Kleinfelder, Inc. 1999). A fifth unit, containing sealed capacitors, could not be sampled and is assumed by the National Park Service to contain PCBs. Two of the four pieces

of equipment found to contain PCBs had PCB concentrations of 50 parts per million, a level that requires disposal by incineration under state regulation. The other two pieces of equipment had concentrations of 5 parts per million, a level at which state regulation allows the oil to be collected by a licensed oil recycling contractor. After the oil in the PCB-containing units is properly drained, the units can be disposed by incineration or landfilled at a Class I landfill. Disposal of the units unaffected by PCBs is not regulated. The substation assessment also noted oil staining on some of the equipment and on the concrete slabs where the equipment is located. Samples were collected of surface soil and soil at a depth of approximately 1 foot around the concrete slabs, and one small area of surface soil was found to contain PCBs. The amount of soil affected and concentration of PCBs identified were such that the soil could be collected in a drum and sent to a Class II landfill permitted to accept such wastes. The assessment indicated that the National Park Service would need to contact the California Department of Toxic Substances Control to discuss appropriate cleanup goals for the site and the level of oversight, if any, that would be required (Kleinfelder, Inc. 1999).

Topics Dismissed from Further Analysis

There would be no direct, indirect, or cumulative impacts on the following resources as a result of the implementation of any alternatives proposed in this environmental assessment.

Wilderness Experience

Implementation of the Yosemite Lodge Area Redevelopment would have no impact on the wilderness experience in Yosemite Valley. The project area is not located within the designated Wilderness of Yosemite National Park.

Land Use

Land uses within Yosemite National Park are classified as "Parklands," regardless of the individual types of land uses that occur within the park. The proposed action in the project area would not affect the Parklands land use within Yosemite Valley; therefore, land use is not discussed further in this environmental assessment.

Environmental Justice

Environmental justice analyses determine whether a proposed action would have "disproportionately high and adverse human health or environmental effects . . . on minority populations and low-income populations." The National Park Service and other federal agencies have determined that a disproportionately high and adverse effect on minority and low-income populations means an adverse effect that would result in either of the following two scenarios:

- The effect is predominately borne by a minority population and/or a low-income population.
- The effect will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

No aspect of any alternative of the Yosemite Lodge Area Redevelopment would result in disproportionately high and adverse human health or environmental effects on minority or low-

income populations; therefore, environmental justice is not considered in this environmental assessment.

Prime and Unique Agricultural Lands

There are no agricultural lands in the project area, nor would the proposed action under the project alternatives have indirect effects on downstream agricultural lands. Thus, no further discussion of this topic is necessary.

Museum Collections

Implementation of the Yosemite Lodge Area Redevelopment would have no impact on the National Park Service museum collection. The quantity of artifacts recovered as part of the archeological data recovery efforts would not be likely to increase the size of the museum collection.